FOOD INDUSTRIES

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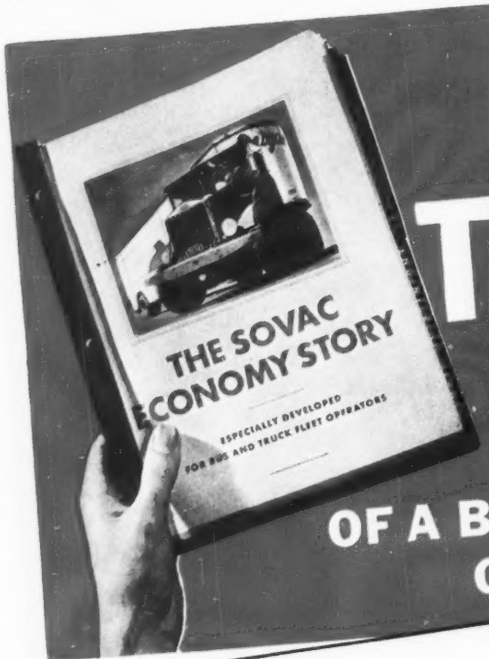

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SOCONY-VACUUM

Contents for November, 1936

Volume 8, Number 11

FOOD INDUSTRIES

PRODUCTION • ENGINEERING • DISTRIBUTION

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Published monthly: price 35c a copy. Subscription rates: United States, Canada, Mexico, and Central and South American countries, $3 a year. All other countries, $5 a year or 20 shillings. Entered as second-class matter Aug. 17, 1936, at the Post Office, Albany, N. Y., under the act of March 3, 1879. Cable address: "McGrawhill, New York." Member of A.B.P. Member of A.B.C. Contents indexed monthly in the Industrial Arts Index.

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McGraw-Hill Publishing Company, Inc.

Publication Office: 99-129 North Broadway, Albany, N. Y.

Editorial and Executive Offices: 330 West 42nd St., New York

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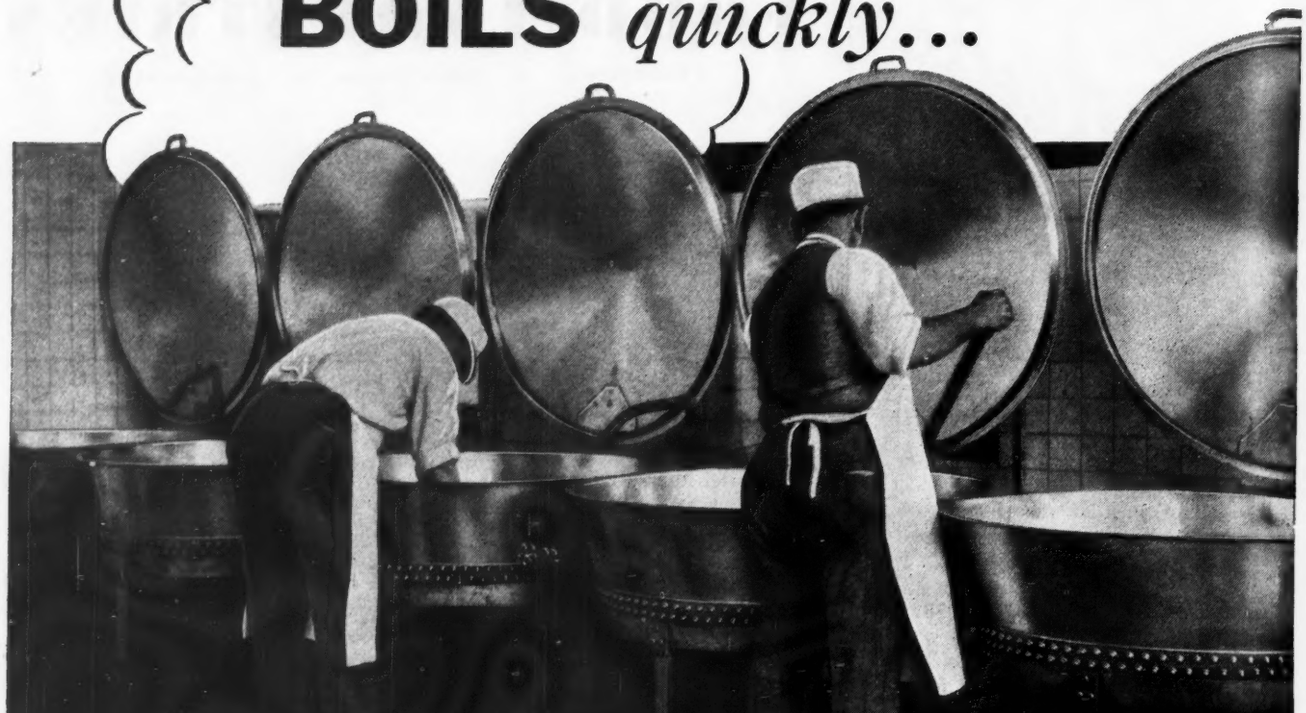
BOILS *quickly...*



• **HEATING AND BOILING WITH NICKEL STEAM-JACKETED KETTLES.** *A few of the Nickel Steam-Jacketed Kettles at plant of Richardson & Robbins Co., Dover, Del.*

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...and does both cleanly!

—that's why you find NICKEL *doing both in so many up-to-date food plants*

WHETHER you're boiling soups or freezing ice-cream, lard compounds and shortening, you're vitally concerned with how rapidly your equipment transfers heat. For time saved means fuel and labor saved . . . and you don't need anyone to tell you that this means money.

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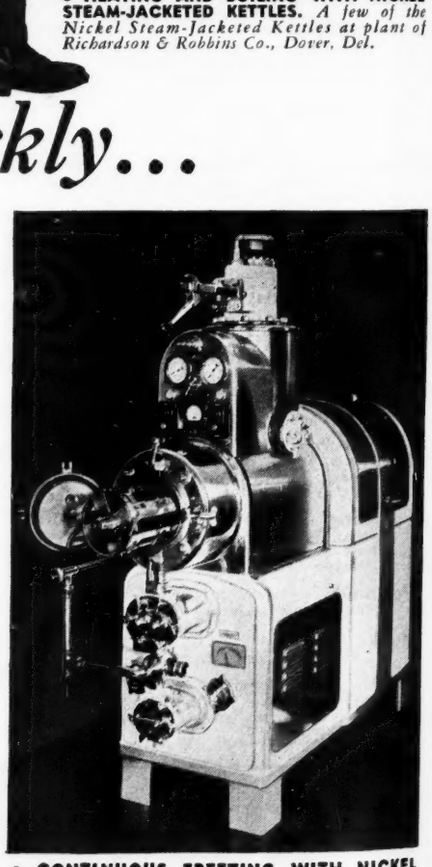

• **CONTINUOUS FREEZING WITH NICKEL CYLINDERS.** *New "CP" continuous ice-cream freezer made by Creamery Package Mfg. Co., Chicago, Ill. The freezing cylinder is made of 5/16" wall Pure Nickel, rolled, welded and ground to exact size.*

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FOOD INDUSTRIES

PRODUCTION • ENGINEERING • DISTRIBUTION

Established 1928—McGraw-Hill Publishing Company, Inc.

Vol. 8, No. 11

Laurence V. Burton, Editor

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NOVEMBER 1936

THE TALK OF THE INDUSTRY

WANT to know a short way to a sizeable whack of money? Start a real live Consumer Cooperative in Boston.

For the benefit of the customers west of the Hudson River, it should be told that in Boston is a very large, very successful department store owned largely by the Filene brothers. It happens that Mr. Edward A. Filene is all hipped on Consumer Cooperatives and has endowed an institution to stimulate them. He calls it "The Consumer Distribution Corporation."

Its function is to answer inquiries for help, study the location to see if it is "ready for cooperation." Then, if it is "ready," the C.D.C. will finance and manage the outfit until it becomes self sustaining.

Under considerable pressure from us, when we were in a diabolical mood, the Secretary-Treasurer of the C.D.C. admitted that Boston is not yet ready for cooperation. Why? Well, you see, Mr. Filene is still in business in Boston. Of course, you get the idea.

THE first pay-off on AAA's soil conservation program began on Oct. 15 and is to continue until 6,000,000 farmers have received checks for a total of $470,000,000, minus—oh, a

few millions for administrative expenses. We shrewdly guess this will all be paid before Nov. 3, and the farmers will be rewarded by about $10 an acre for taking AAA's advice on soil conservation. We wish some one would pay us for taking advice. The best we are able to do is get paid for giving it—when we are lucky.

ORDINARILY we do not give out formulas. In fact, we never do, despite all manner of pleas for complete working directions for this or that. However, the huge number of requests for the formula for the zujak, from our more mature clientele, has caused a complete breakdown of our otherwise high principles. You will find the formula—such as it is—on the next page.

SOMETHING that always tickles our risibilities is the prominent man who preaches greater per capita food consumption as the salvation of the food business. We know him, and just between us—ssh, don't tell a soul

—he eats very carefully in order to keep his weight down. The last time we saw him eat he managed to get away with a salad and a glass of milk.

ONE of this autumn's indoor sports is that of forecasting the bills to be introduced in the next session of Congress. They all seem to center around the Honorable Wright Patman whose name is now as much of an office word as Copeland, Wagner or even Tugwell.

This time the predicters insist that the next Patman bill is to prohibit a manufacturer from shipping in interstate commerce any article to be sold at retail by the manufacturer. And, of course, this is directed against consumer cooperatives, chain stores and mail order houses that may have their own factories. It may be a comforting thought to those who would hamstring the chains and cooperatives—but suppose Mr. Patman were not to be reelected!

OUT of that canyon of iniquity, known as Wall Street, has come this tale. A rather able gentleman

who works down there had his innings with a certain food manufacturer who had incurred his wrath. The said gentleman, his wife, and two children, and a maid servant had all been seriously poisoned after partaking of manufactured food about a year ago. His wife nearly died and all were laid up for several days.

It is reported that several other people were made ill at the same time, and competent epidemiological evidence indicated that the same food was responsible for the illness of all. At any rate the gentleman, aforesaid, incurred an expense for medical services amounting to a little less than $200. He asked the manufacturer to reimburse him by that amount.

This manufacturer, relying perhaps too implicitly on his lawyer's advice, rather than common sense, sent an un-

couth, boorish professional investigator to the home of the claimant. Unfortunately the claimant failed to see the point of the investigator's rather heavy attempts to laugh away and pooh pooh the illnesses. At the end of an hour's interview the investigator was shown to the door. In fact, he was invited to leave the premises. The studied calm of the claimant would have been, let us say, ominous to a more astute person. The company monkey-diddled along for several months. No decision, no offer to discuss, no compromise—nuthin'.

Suit was instituted. The food manufacturer settled out of court for ten times the amount originally asked for. It could hardly be termed a shakedown for the claimant did not exactly need the money.

Last month the food manufacturer felt that the market for shares in his company needed the deft Wall Street touch. He sent his treasurer to a big financial house to suggest that the house invest—Oh, a couple of million or so in his shares. Then it could maintain an active, stable market.

The treasurer made an impressive presentation of the case to a strangely quiet man in a small office. Statements of earnings, policy, prospects, splendid management were trotted out. For two hours the treasurer did his stuff. And then with that same ominous studied calm the quiet man explained patiently to the now speechless treasurer that his opinion of a management which would fail to settle his honest claim until forced to settle for ten times the original amount was lower than a snake's hips.

A Corporation President's Job

AN IMPORTANT thing for any corporation president to do is to get far away from his work every now and then. It may require him to make a trip abroad. But, on the other hand, he may be able to contemplate his work while sitting at his desk without getting all cluttered up in its details.

This is not a sentimental plea for overworked company heads. The sole idea is to get a proper perspective of his company—to see it as others see it, to look at it as if it were someone else's business.

There are some companies in the food business that for years have been allowed to drift into very unpleasant public relations, until today the companies' policies have become political issues.

We do not condemn the quest for profits, for most of us are in business for no other reason; but we do believe that the president of a company must steer an accurate course between profitless operations and hostile legislation. In some of the recent cases we fear that the stockholders' and employees' interests have not been well guarded.

Opportunity Lies in the South

A LONG time shift of sources of raw material for food manufacture is beginning. The forces bringing it about are not the drought nor AAA restrictions. Rather they will arise out of secondary reactions from mechanical cotton picking.

Food processing will find its biggest future development in the South. Alert food manufacturers are already building or buying Southern plants. And young men who want to start their own businesses will find that they can swim with the tide if they can adapt themselves to the new trend. Opportunity now lies in the South.

Need for Better Labor Policies

BY THE time these words come to you it is likely that the outcome of the Nov. 3 elections will be known to all. Yet though there may come about a change of administration there are always a few Senators who hang on for a couple more years. So we can expect further hearings by the LaFollette civil liberties investigators.

Apparently that committee believes that all employers are unfair and that only employees are ever deprived of their rights. Without question many workers have been shabbily treated in industry. But to blame all this upon the employers is to close our eyes to

Hors d'Oeuvres

• Sausage manufacturers set an all time record for production during the first half of the year. Well, in good times the public always would swallow a lot of bologna. And then this is election year.

• *Aristoxenus, the ancient philosopher, is said by historians to have watered his lettuce with sweet wine, producing a vegetable that was the wonder and despair of his contemporaries. His contemporaries probably wished they were the worms in his garden.*

• We fear we have offended our best friend. Last month we said that dog food no longer bore the stamp of approval of the government inspector. Now it develops that it still bears such a stamp, but in a revised form. We hope our dog will forgive us.

• *By request we publish the following brief description of the zujak of the Turkish Harem mentioned in this column in September. It is made by stringing the small green kernels of the pistachio nut or the sweet almond or walnut. The string is then dipped into a mixture of vegetable gelatine and either palm or date syrup to which a few drops of attar of roses has been added, the dipping process being repeated several times to build up a thick coating.*

• *Clocks have been installed in the coaches of Chicago Rapid Transit Lines by Beech-Nut Packing Co. Tardy commuters, seeing that they are late, will think of their boss, become nervous and reach for a life-saver or a stick of gum.*

• California fancy wines are approaching the quality of pre-prohibition days when they won many medals in international competition, so we hear. We know you never touch alcoholic beverages, but we thought you might have an academic interest.

• *Thanks to George End, the Arcadia, Fla., rattlesnake canner, one man's poison is another man's meat. But Mr. End reports that rattlers are becoming scarce in his section of Florida. So the next time you meet up with a nice juicy diamondback, will you give it Mr. End's address?*

• The "Hen of the Year" will be chosen at the Poultry Industries Exposition this month. The "chicken" of the year was chosen at Atlantic City in September.

• *Headline: "Packers Hides are Strong But Quiet." Something like limburger cheese, or Flushing Bay at low tide.*

the great and growing labor rackets that exist.

Management has a serious obligation to carry out. Workers who do not want to be imposed upon by their self-appointed labor leaders, often called by other names, have no powerful friends to turn to in time of need unless it be to management. If management shuns them, the lonely individuals may be driven to accept, even to embrace, conditions that are distasteful to them.

The next four years will set a pattern for decades to come.

Losing our Philippine Markets

REFERRING to our remarks about "ain't we got fun?" which appeared in a previous issue of FOOD INDUSTRIES, here is another comparable case.

No single political force has been more effective towards giving the Philippines their independence than the dairy farmers. They wanted to keep out coconut oil in order to hinder the production of oleomargine in the United States. How is their plan working out? Well, for one thing, large manufacturers of margarine are now making it from domestic fats, especially cottonseed oil.

But get a load of this. The new Philippine Government now has a man in the United States looking up margarine manufacturing equipment. It appears likely that they will be making their own margarine in the very near future. Furthermore they will buy dry skim milk for culturing and churning with their cocoanut oil to give it flavor, but they won't buy it from the United States.

Our exports of dry milk to the Philippine Islands was 413,000 lb. in 1934. They also purchased from us 243,868 lb. of butter in that year. The plan now is for the Philippines to manufacture oleomargarine from their own coconut oil, buy the dry milk from Japan, not the United States: And it is stated that the Japanese are now able to supply dry milk at half our best price. Also they are selling evaporated milk in the Philippine Islands today at half our prices. Where the Japanese keep their cows we don't know. But we do know that U.S. exports of evaporated milk to the Philippines in 1934 was 19,905,683 lb. If the Japanese can undersell us by 50 per cent in that market, one wonders just how long that market will be receptive to products of the United States. The gentleman from the Philippines explained sadly to us "The attitude of the people of the United States is forcing us into closer and closer business relationships with Japan."

It would appear that certain factors in the dairy group might do well to employ a good public relations counsel.

Ain't we got fun?

Let's Get Straight on This

RECENTLY we asked an equipment manufacturer if he had sold many units of a certain item to the food industries. This machine is as indispensible to the operation of a dairy as gasoline is to an automobile. He consulted his records. He reported he had sold only two such machines in a year to food manufacturers. Then who, he was asked, is buying your output? You have a pretty big plant. Are you making them up just for fun?

The manufacturer was annoyed. "We sell thousands of these machines every year to the dairy industry."

Evidently milk is not a food in their thoughts.

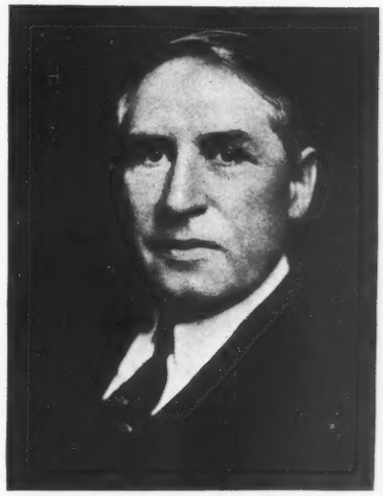
Last month we saw some employment figures in the Chicago *Tribune*. They were released by the American Bakers' Association. The figures compared employment in the baking industry with employment in the food industry and in all industry. Mind you, the item did not refer to the *other* food industries, nor to the *entire* food industry. It compared bread and food.

There are also innumerable cases where the food manufacturers themselves fail to think of themselves in their true role, as food manufacturers. To hear some of them talk, you'd think that nobody outside of a cereal breakfast food manufacturer was in the food business.

The time for a united front is here. And the first step requires a correct understanding of the fact that we are all in the *food* business.

Possible Power Shortage Ahead

DURING a recent trip through the famous turbine shop of General Electric Company we saw the place pretty well filled up with jobs in progress. To an outsider it did not look as if many more jobs could be crowded in. Most of these were central station power units of from 20,000 to 60,000 kw. capacity.



DR. HERBERT A. BAKER

Recently elected president of American Can Co., Dr. Baker is a food technologist of repute. He has been responsible for many scientific investigations resulting in important improvements in the canning of foods. He joined American Can in 1906 and four years later was made chief chemist. He became Chicago sales manager in 1918 and vice-president in charge of sales in 1932.

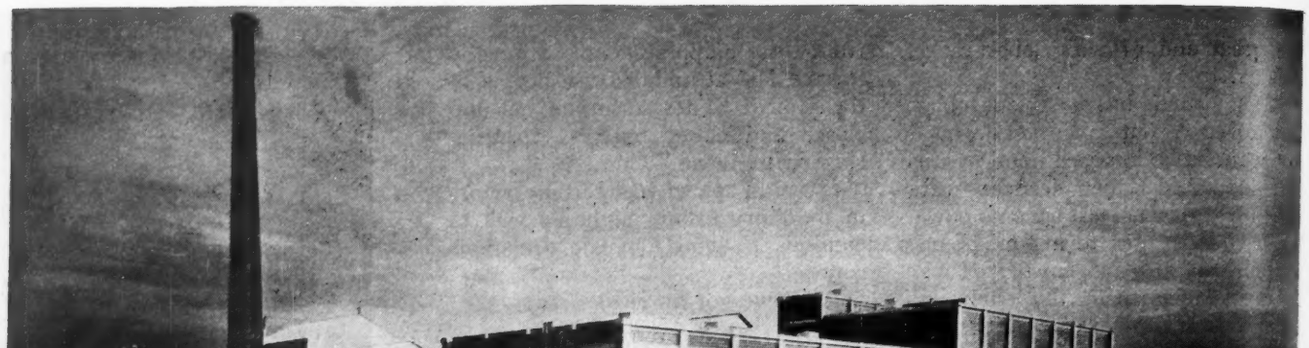
Since it takes a minimum two years, and often three years, from the time of signing the order to the final erection and operation of a big turbine and generator, it is apparent that the orders for these machines were placed only a year ago. Not many of them will be in operation much before 1938.

On the other hand, some of the public utility companies are now running so close to capacity that the disabling of a big generator would cripple them. Yet they have not placed orders for additional capacity. If all of them were to order new machines today, it would be 1939 or 1940 before deliveries could be made.

So serious is the situation that one manufacturing concern (not in the food business) has been hunting over an important section of the country for a place where it can purchase 30,000 kw. continuous load, firm power. And they say it cannot be bought today.

Though such huge loads are unusual for food plants, the power situation in the next two years is one that may cause anxiety to food manufacturers or prevent desired expansion. Further reduction in power rates will increase the existing demand.

If you are a far-seeing individual, you will investigate the situation in your own area and reckon with a possible shortage during 1937, 1938 and possibly 1939.



Symbolic of a sectional trend in food manufacturing is this new general-purpose meat packing plant at Albany, Ga. Constructed by Cudahy Packing Co., to take advantage of increasing supplies of livestock in the South, the plant is claimed by its builders to be the most modern meat packing plant in the world.

Southern Meat Plant Marks Trend

Cudahy builds factory at Albany, Ga., to capitalize on increased production of livestock in South. Plant has glass walls, no windows, is air conditioned.

▶ ***This article discusses a trend in food production and processing and describes a new type of building construction, both of which affect***

All Food Manufacturers

THE food industry has been heading South for a number of years. The trend had its beginning in a small way when Texas started to produce cotton. With its level land adapted to machine methods of cultivation, the Lone Star State was able to grow cotton with less labor and sell it at a lower price than the upland cotton areas of the Old South. This competition reduced the income of many of the Southern farmers and led them to diversified crops as a means of cutting their cost of living.

Then came 6-cent cotton (FOOD INDUSTRIES, Nov., 1931) and correspondingly low-priced tobacco, so that diversified farming was a matter of necessity to many who had been producing only cash crops. Deprived of a subsistence from their important products, these people lent an attentive ear to the "live-at-home" preachings of Southern agricultural leaders.

All that took place before the depression and the New Deal. What happened since is well known. The AAA gave birth to a plan for plowing under cotton to reduce the surplus and raise the price. This freed land for other uses, giving a further boost to food production south of the Mason-Dixon line.

The net result of all this has been to awaken the South to the fact that there is no good reason why it should "import" food from the North. And the farmers there now appreciate more fully the fact that they have land and climatic conditions which in many ways equal anything in the North for diversified farming.

So the Southern farmer is becoming an important food producer. He is growing more food than he and his family can eat. Much more, in fact. And thereby arises a supply of raw material for food manufacturers and processors.

With a supply of material and a market for finished products in the South, it doesn't take any brain truster to arrive at the conclusion that it is good business to process down there. So we see a very definite move on the part of food manufacturers to modernize and expand their Southern plants. Some are building new and up-to-date factories equal to anything they have in the North. These include meat packing, canning, cheese manufacturing and other food establishments. The six long years of depression delayed this trend, of course, by tightening the purse strings on new investments. But now that business has climbed back to an encouraging level, the movement surges ahead.

Perhaps the outstanding single example of increased food manufacturing capacity in the South is the new plant of Cudahy Packing Co., at Albany, Ga. Put into operation in September, this plant is not just a branch house where products from the Northern factories of the company can be refrigerated until they are distributed. Neither is it just a place where livestock can be killed and chilled to be shipped North for processing and subsequent distribution. Instead it is a full-fledged, general-purpose factory which draws its supply of raw material from Southern

states, does a complete line of processing and then distributes the finished products in its own section of the country. It is to the South what one of the larger packing houses in the midwest is to the North.

The reasons for building this plant at Albany have been stated by E. A. Cudahy, Jr., president of Cudahy Packing Co., which has its headquarters in Chicago. He said: "Improved methods of breeding and feeding cattle, sheep and hogs are now applied widely by Southern farmers and livestock raisers. With the establishment of the Albany plant, we welcome every opportunity that is presented to cooperate with the livestock and agricultural interests of Georgia and surrounding states to further the production of meat animals of the finest quality. Also through this plant we will be in a much more favorable position than heretofore to supply our distributing branch houses throughout the South with our meats and allied commodities. We have operated distributing branches for more than 40 years in many of the principal cities of the South. Our company is, I believe, well known there, and our products enjoy a high standing in the Southern market. We feel that our new Albany plant will enable us to increase our business there materially, and it will be our purpose to maintain it at the highest point of efficiency and increase its capacity as circumstances permit in the interests of the livestock producer, the farmer, the consuming public and our company."

Cudahy calls this plant the world's most modern packing plant, and discounting the company's enthusiasm for its own accomplishments, it can be said that the plant is at least one of the most modern in the world. It is a large plant, having a capacity to kill, chill, cut, process and store 7,000 hogs, 1,000 cattle, 350 sheep and 350 calves a week. The main section consists of a basement and two stories above the ground. Slaughtering is done on the top floor to give a downward flow of material, as in other packing plants. The first floor is occupied by coolers, freezers and by cutting, packing and shipping departments. Separate buildings are provided for the power plant, employees' dressing rooms and for the government inspectors' offices.

Facilities for rapid unloading of livestock and for quick loading and distribution of finished products have been provided. The plant is located on the tracks of the Atlantic Coast Line Railroad, and it is equipped with loading docks long enough to accommodate 25 cars.

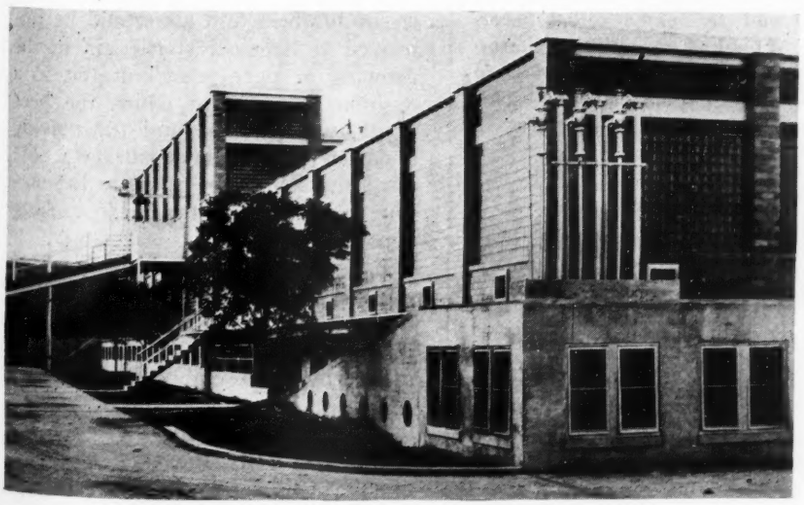
In addition to being a milestone in a manufacturing trend, this new Cudahy plant symbolizes a trend in building construction. With walls built of glass masonry instead of bricks, the plant represents a radical departure from methods hitherto employed in packing-house design. The new masonry consists of "Insulux" glass blocks of hollow construction. Each of these is 8 in. high, 8 in. wide and 4 in. thick. Thirty thousand of them are in the walls of the plant.

The new glass masonry has proven sturdy and durable, and it has the advantage of requiring no protective coating of paint either outside or inside. The latter feature solves a maintenance problem of long standing in many food plants. Where moisture arises from the processes, as it does in the packing plant, or where there are corrosive fumes or vapors as in many other types of plants, it is expensive as well as troublesome to keep the interior walls painted. The glass walls also do away with the painting of window sashes, replacement of broken panes and the cleaning of windows, because there are no windows in the walls. None are needed to transmit light, because the glass does that. And none are needed for ventilation, because the entire Cudahy plant is air conditioned. This brings up two properties of the glass blocks without which they would not be suitable for this type of construction. One is their ability to transmit and diffuse light while at the same time being opaque to vision. The other is their insulation value, lacking which it would not be practicable to use glass-block walls in a plant where air conditioning or refrigeration is used extensively.

Perhaps it is a testimonial to the speed with which glass masonry can be put up that the Cudahy plant was completed within 63 working days after the contract was let. Though of course that had nothing to do with the fact that 7,500 cu.yd. of earth was excavated in seven days to make room for the basement, or that 900 tons of structural steel was shipped to the location and put together in short order.

This plant will make a deep impression on the South and perhaps will give Cudahy an advantage over competitors with less modern factories in that section. At any rate, the company plans to take full advantage of the plant's promotional possibilities. The grounds surrounding the factory are being landscaped, and when illuminated at night, the glass block building will make an impressive scene.

As more food manufacturers take steps similar to that of Cudahy and put modern plants in the South, the trend of food production to that section will be accelerated even more. As manufacturing facilities grow, so will grow the demand for livestock and other raw materials. And as this demand develops more and more farmers below the Mason-Dixon line will turn from the old cash crops of cotton and tobacco to the cash food crops of the Northern farmer.



The Cudahy plant has walls of glass masonry instead of brick. There are no windows, the walls themselves transmitting light. For ventilation, the building is completely air conditioned.

Sterile Air Gets Public Showing

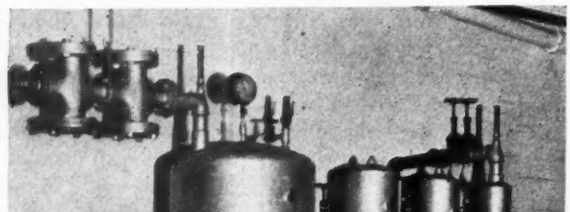
TWICE during the past month food manufacturers have viewed public showings of a machine for making sterile air on an industrial scale.

Master brewers attending their annual convention saw an installation at work in the plant of C. Schmidt & Sons, Inc., Philadelphia's oldest and largest brewery. Visitors to the National Dairy Exposition in Atlantic City were shown the original machine for making sterile air as described in U.S. Patent No. 1,736,839 granted Nov. 26, 1929, to Joseph F. Schiller and Walter W. Wescott, both of Philadelphia.

Just why this technological accomplishment has been so long in getting before food manufacturers in a public way is a story in itself. Present interest in this method of making ordinary atmospheric air sterile lies in its satisfactory use in both the dairy and the brewing industries for transferring and agitating liquid foods without contamination by dirt, odors, or microorganisms and without excess foam formation. By handling both milk and beer satisfactorily, sterile air bids fair to come in for wider use throughout food manufacturing.

The first requirement is that the air be always 100 per cent free from dirt, odors, bacteria, yeasts, and mold spores. The second requirement is that this sterile air be obtainable at a reasonable cost.

U.S. Patent No. 1,706,594, covering this method of sterilizing air by compressing it to approximately 45 lb. per sq.in. with subsequent expansion through several successive steps to about 37 lb. per sq.in., was granted March 26, 1929 after five or six years of negotiation and litigation with the U.S. Commissioner of Patents. Explanation of what takes place during the compressing and expansion of the air for the destruction of the microorganisms was the obstacle which held up the granting of the patent.



Centrally located in a storage cellar this unit sterilizes all the compressed air used by C. Schmidt & Sons, Inc. in the moving, bottling, and barreling of its beer and ale as well as that which aerates its brewers' yeast culture. The tank or tubes are empty closed cylinders fitted with inlet and outlet pipe connections, needle expansion valves, and drain cocks. Four compressors with a total capacity of 200 cu.ft. per minute supply air at 40 lb. per sq.in. to this unit.

The temperature of air is raised to only about 100 deg. F. above atmospheric temperature during the compression. It drops to about 70 deg. F. during the expansion. Obviously the sterilization was not the result of heat of compression. When used, the sterile air is tapped from the last expansion chamber through a needle valve at the pressure desired.

During the period of patent negotiations the original unit was commercially in use at the Scott-Powell Dairies plant, Philadelphia, sterilizing air to unload milk from glass-lined truck tanks. From 1922 to the end of its corporate life Scott-Powell Dairies used sterile air under a pressure of 26 lb. per sq.in. to deliver milk from truck tanks to the third floor storage tanks at a saving of 42.3 cents per 1,000 lb. over its old system of dumping the milk from cans and pumping it to the storage tanks.

Since 1931 Supplee-Wills-Jones Milk Co.,* Philadelphia, has used compressed air sterilized by this method to move raw milk from glass-lined truck tanks to storage vats and to keep the milk in gentle agitation while in storage awaiting pasteurization.

About a year ago Arthur H. P. Hipp, Master Brewer at C. Schmidt & Sons, Inc., decided that the quality of his beer and ale would be improved if he used sterile air in the growing of pure yeast cultures, as a cushion in tanks to which the beer or ale was pumped and for moving the beer and ale from storage to the government gaging tanks, to the bottling house, and to the barrel racking department.

Evidence that the air is freed of microorganisms during its passage through the sterilizing unit has been proven by numerous tests and studies made by the Supplee-Wills-Jones Milk Co., laboratories and by a brewing consulting laboratory for C. Schmidt & Sons, Inc.

The technic followed by the Supplee-Wills-Jones Milk Co. laboratory

> ► ***After thorough trial in handling milk and fermented cereal beverages, a method of sterilizing atmospheric air is made available to other food manufacturers. This method should be of interest to***
>
> **Bakers**
> **Beverage Bottlers**
> **Brewers**
> **Confectionery Manufacturers**
> **Egg Dryers and Freezers**
> **Fruit and Vegetable Canners**
> **Fruit and Milk Dryers**
> **Meat Packers**
> **Milk Handlers**
> **Sugar Refiners**
> **Syrup Makers**
> **Yeast Growers**

* *Food Industries*, September, 1931, p. 408.

in testing the air is as follows: Air from outlets tapped into the different sections of the system is let blow over sterile culture media in Erlenmeyer flasks. In some cases 50 cu.ft. of air is blown over the culture media while in other cases 100 cu.ft. of air is used. The flasks are incubated at 98 deg. F. for seven days. The tests are consistent in showing that air leaving the sterilizing unit is free from microorganisms. The results of a representative test show the following:

1. Air in compressor room heavily contaminated.
2. Air at compressor outlet contaminated.
3. Air in first (6 in. diameter) expansion task slightly contaminated.
4. Air in second (8 in. diameter) expansion tank slightly contaminated.
5. Air in third (10 in. diameter) expansion tank sterile.
6. Air in fourth (24 in. diameter) expansion tank sterile.
7. Air at discharge valve sterile.

In a special series of tests C. J. Austin of the Supplee-Wills-Jones Milk Co. laboratories bubbled 100 cu.ft. of air through four liters (1 1/6 gal.) of a special broth containing lactose, peptone, and trypsin. This broth had been sterilized on two successive days and incubated for seven days to make certain it was sterile before being used to test the sterility of the treated air.

After 100 cu.ft. of the treated air had bubbled through the broth it was incubated at 98 deg. F. for seven days followed by 48 hours at room temperature.

The tests were of an extreme character because the air going into the compressor was inoculated with from one to five grams of a powdered *B. subtilis* culture in lactose. It was estimated that this powder contained two billion *B. subtilis* per gram. In some cases the air drawn into the compressor came through a bag containing room dried street dirt.

In all the tests when the pressure of the air between the compressor and the first (6 in. diameter) expansion tube was kept at 45 lb. per sq.in. the air drawn from the third (10 in. diameter) and fourth (24 in. diameter) expansion tanks or tubes showed no evidence of bacterial, yeast, or mold contamination after incubation. In almost every test the air taken from the compressor discharge showed contamination after 48 hours incubation at 98 deg. F.

The tests were run on two different compressors. Temperature of the air from one compressor varied from 100 to 200 deg. F. The 200-deg. temperature resulted when the compressor had been running for some time. Temperature of the air from the other compressor varied from 90 to 140 deg. F. Air from the first compressor proved sterile in three out of ten tests made. Air from the second compressor proved sterile in one test out of six made.

The air leaving the compressor cooled immediately to 70 deg. F. as it passed through the expansion valve leading into the first expansion tube of the sterilizer unit. It had a temperature of 68 deg. F. and less when it left the discharge valve on the unit. This is as could be expected as air gives a cooling effect upon expanding. Moisture in the air condenses out upon cooling of the air.

As a check on the test broths which gave sterile results on the tests run, the stoppers were taken out of the flasks, the broth was exposed to atmospheric air for one to two minutes, the stopper replaced, and the broths incubated again. In every case these broths showed heavy contamination after incubating for 24 hours which proved that the air first bubbled through these broths must have been sterile.

As used by the C. Schmidt & Sons, Inc., the sterilization unit consists of four expansion tanks 8 ft. high and with 6, 8, 10 and 24-in. diameters respectively connected in series and three sterile air reservoir tanks with connecting pipes and needle valves to regulate the flow of the sterile air to each tank as well as to each department in which it is to be used.

For moving beer and ale from one tank to another 15 lb. per sq.in. pressure is used. In the racking room 18 to 20 lb. pressure is needed to prevent escape of CO_2 from the beer and ale during the keg-filling operation. In the yeast culture vats 10 to 15 lb. pressure is used to keep the yeast-growing wort agitated and well aerated for best yeast growing conditions.

Although the sterile air leaving the 24-in. expansion tank passes through a specially constructed filter to remove traces of scale and the like, which may be picked up in the lines and expansion tanks, it is again filtered as it comes from the storage tank in the yeast culture department.

Each of the expansion and storage tanks is fitted with a drain cock in the bottom for the removal of water of condensation.

The type of compressor used is not a patentable feature of this method of sterilizing air. Any type compressor may be used. But when oil-lubricated compressors are used an oil separator in the line before the first (6-in. diameter) expansion tank is necessary if the sterilizing tanks are to be kept free from oil trapped in the compressed air. In such installations as that at the Schmidt brewery, oil separators are unnecessary as the compressors are of the rotary type in which no lubrication is used.

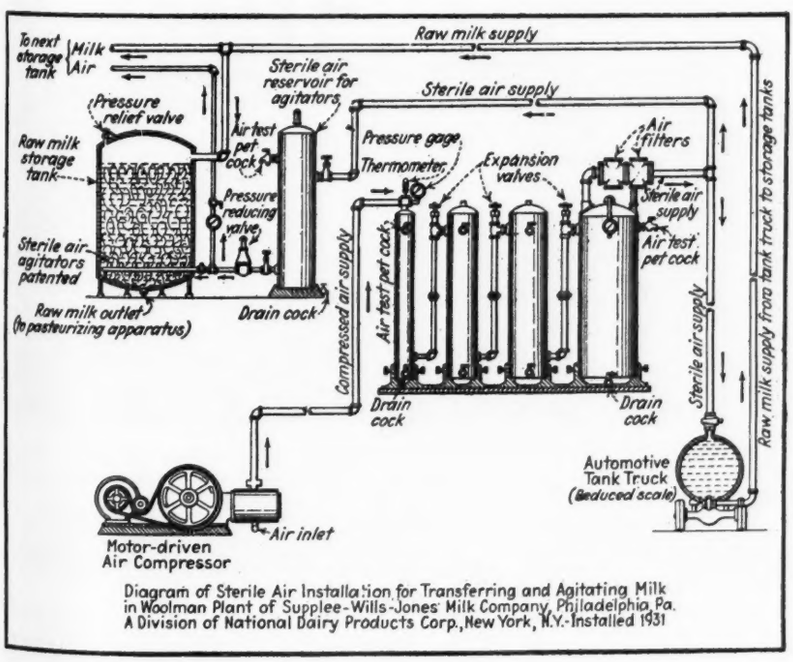


Diagram of Sterile Air Installation for Transferring and Agitating Milk in Woolman Plant of Supplee-Wills-Jones Milk Company, Philadelphia, Pa. A Division of National Dairy Products Corp., New York, N.Y.-Installed 1931

Materials Handling Made Easy

Power-operated lift trucks move heavy loads quickly over long distances. Eliminate much rehandling in canning plants

▶ *The methods of handling materials described in this article are of interest to:*

All Food Manufacturers

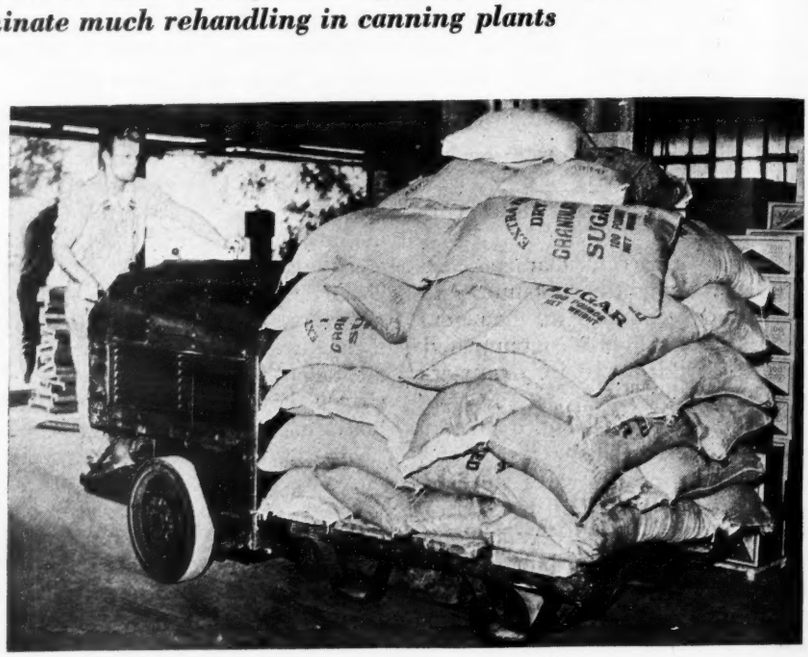


Fig. 1—Moving 2 tons of sugar from warehouse to syrup-and-brine department of canning plant in one trip. This low-lift truck also handles skids loaded with boxes of fruit and vegetables, with cases of canned goods and with knocked-down cases.

Fig. 2—It takes hundreds of knocked-down solid fiber cases to make a load for this low-lift power truck. Carried to warehouse in this manner, cases remain on skid to be picked up for quick transportation to packaging department.

CANNING PLANTS usually are built close to the ground. Most of them are low, rambling structures which, instead of reaching skyward, spread out horizontally over many acres. Such an arrangement, of course, does away with the problem of elevating and lowering materials from floor to floor. But at the same time it makes necessary the transportation of raw materials and finished products over long distances on one level. And as the operations of the canner have expanded and as his necessity for cutting costs has become more urgent, he has looked for more efficient methods.

Partly because of the nature of his operations and partly because of the distances over which materials must be carried, the canner has found in the power truck an implement which meets his needs. At a Pacific Coast plant of one of the largest canning and packing companies, a fleet of heavy duty power industrial trucks has completely revolutionized the operations of unloading and transporting fresh fruits and vegetables to and out of the processing departments.

But the canner uses these trucks not alone for conveying fruits and vegetables. He finds them efficient also for carrying other supplies such as sugar. One bag of sugar may be all one man can carry, but 40 bags, or 2 tons, are handled with ease on the modern power truck. In Fig. 1 can be seen such a load, piled on a skid which has been lifted off the floor and is being taken from the warehouse.

The same power truck which enables one man, however slight, to tote two score of 100-lb. bags also makes short work of transporting knocked-down solid-fiber shipping cases. The one shown in Fig. 2 has gone to the warehouse and picked up a skid loaded with hundreds of cases for canned tomatoes.

But one of the most interesting uses to which the canner has put the power lift truck is in the handling of cans on

cooker trays. For many years it was a standard practice to stack these trays about twelve high and pick them up with two-wheel hand trucks equipped with high standards. The bottom tray would be turned upside down to provide a clearance of about 1 in. so that the truck could get a hold.

Now, six stacks of cooker trays are handled at one time by a special power lift-truck which moves the load from point to point three, four or even five times as fast as the hand trucker formerly moved a single stack. This truck, Fig. 3, is equipped with a pair of blades, or a fork, which is inserted under the bottom tray to pick up the stack. And these blades are attached to a backrest which not only raises to lift the load but tilts backward to prevent any of the trays from falling off.

This same type of equipment also has been applied to the transportation of cases and cartons of canned goods, as well as boxes of incoming fruits and vegetables. The truck in Fig. 4 has just picked up 42 cartons and will travel directly into the freight car to spot its load precisely into position.

Canned goods in wooden cases also are handled on skids. The low-lift type of power truck shown in Fig. 5 is taking 56 wooden cases from the warehouse to the freight car.

Sometimes the cases are stacked on light wooden pallets instead of skids. In that event, the entire load remains on the pallet during transit, to be picked up as a unit by a fork truck when it reaches its destination.

This truck then can carry the load to a motor truck for delivery to customers, or take it to storage. And when the load finally is broken up, the wooden pallet may be discarded.

This method of handling by pallet and fork truck obviously does away with a lot of labor. It is not necessary to remove the cases from the pallet either when loading the car or when unloading it after the shipment has been made. Each pallet, then, eliminates the back-breaking labor of lifting and stacking 40 or more cases at point of loading and of removing them from the stacks and setting them on trucks at point of unloading. The idea of this, of course, is not that the power truck and pallet make materials handling a lazy man's job, but that they curtail the canner's labor bill.

But whether the materials be handled on pallets or on skids, there is much saving. In either case the load can be moved through various steps as a unit which has neither to be torn apart or reassembled every time it is handled. When a skid loaded with cases is taken to the warehouse, it is set down there with its load intact. And there it remains until it again is picked up by a power truck and taken to a car for loading. The same applies to materials held in the warehouse temporarily.

The lift trucks which the canner uses to such advantage are powered in different ways. Some are operated by electricity from storage batteries, some by electricity from a gasoline-driven generator and some are powered directly by a gasoline engine.

Fig. 5—Low-lift trucks are used too to carry skids loaded with cases of canned food from warehouse to freight car. There are 56 cases in this load. When carried on pallets by a fork-type lift truck, load may be placed in car as a unit.

Fig. 4—Forty-two cartons of canned goods make an ordinary load for this tilting fork-lift truck. The cases are being taken to freight car for loading. The truck will enter the car and "spot" its load in the proper position.

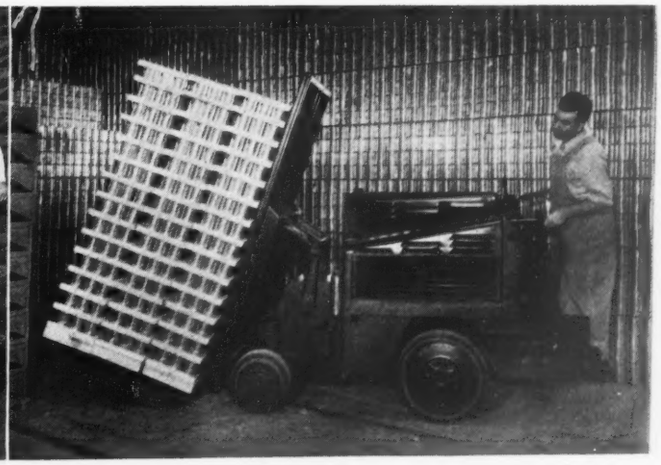


Fig. 3—Tilting type of fork-lift truck carries six stacks of cans on cooker trays where one was formerly carried by hand truck. And it moves them from point to point three to five times as fast. This type of truck was developed especially for this job.

The Menace of Pale Butter

Demand for Light Colored Product Handicaps Producers and Deprives Consumers of Necessary Vitamin A Supply

By M. E. PARKER

Manager of Production, Beatrice Creamery Co., Chicago, Ill.

GROWING demand in Eastern markets for "pale" or "white" butter has created a serious problem. Cow's milk is the only milk used for human consumption that has a pronounced pigmentation of the fat, although the fat of human milk is distinctly tinted at times. Milk fat from goats, sheep, camels and water buffaloes is entirely or nearly colorless.

This preference for a light, or straw colored butter has grown to such proportions, notably in the New York, Philadelphia and Baltimore markets, as to menace the business of butter producers and shippers having a definitely yellow product to sell. They already find their product at a serious disadvantage in such markets, and are being forced to find outlets west of the Alleghenies and south of Washington, D.C.

It is interesting to note that, over twenty years ago, Palmer and Eckles published a series of articles on the yellow pigmentation of milk fat that causes the yellow color of butter. It was first established by these two workers that the yellow color of butter depends primarily upon the amount of carotene in the food of the milking animal.

IT has since been proved that animals derive their supply of vitamin A from plants. The vitamin is in the form of the yellow pigment, carotene, which is sometimes called provitamin A. This pigment is converted wholly by some animals, and partly by others, into vitamin A. Therefore it appears in butter sometimes partly and sometimes wholly converted. Thus, the pioneer study of Palmer and Eckles has acquired considerable practical importance in this present knowledge that the carotene in plant materials, while not identical with vitamin A, is more or less completely converted into vitamin A in the animal body.

The natural yellow color of butter is directly proportional to its carotene content. It is true that the carotene content, or natural yellow color, of the milk fat is not an unfailing measure of the vitamin A strength. But milk fats of high yellow color are rich in this important nutritional factor. There are differences between the yellow colors of the milk fat obtained from different breeds of cows. But, essentially the differences in natural yellow color that can be produced by different kinds of feed are much greater than those which occur among different breeds on the same feed. Therefore, in general, the natural yellow color of milk fat, and also of the butter made from it, is a good practical indication of its potential vitamin A activity.

It is a fact that, in some sections of the Middle West and South, the butter possesses a deep natural yellow color, particularly during the spring and summer months when cows are permitted to graze on green pastures. For example, butter produced in Texas, Missouri, Oklahoma and Tennessee probably has the highest color. Kansas and Nebraska are next in order. Of course, other states, like Illinois, Indiana and Iowa, particularly in their southern sections, also produce butter with a high yellow color during the warmer months of the year.

Generally speaking, in those sections of the country where cows are likely to be out on pasture during the greater part of the year, as is the case in the South, the butter has a higher natural yellow color than in sections where the grazing period is more limited. Similarly, butter produced in the central portion of the Middle West will possess a deeper yellow color than that produced farther north, say in Wisconsin or Minnesota.

In England, butter judges pay more attention to color than is the case in this country. As a matter of fact, it has been suggested by the British scientists Whetham and Hammond that comparison of the color of butter with the French Chrysanthemum Growers' scale would be of great value. It would be of value not only in scoring butter, but also in recording the progress of selection and improvement within the different dairy breeds from year to year.

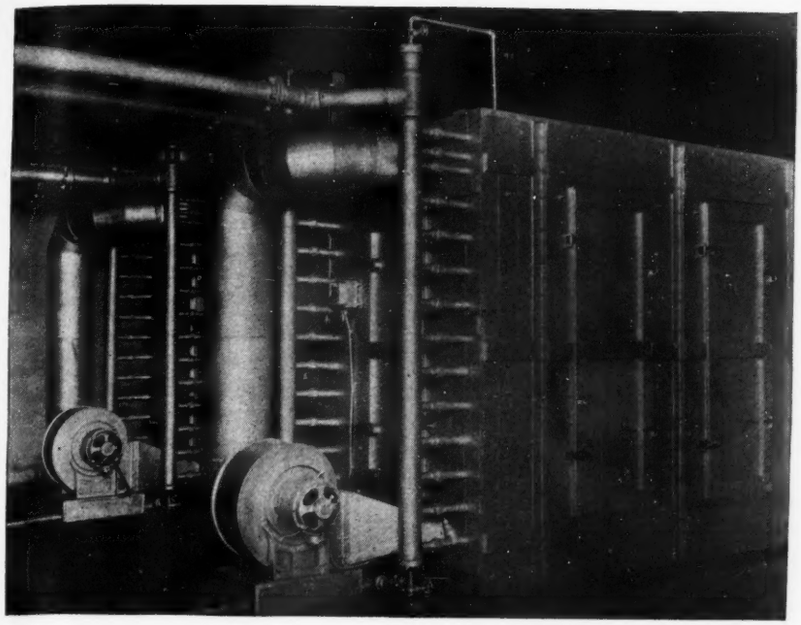
Vitamin A is known as a fat soluble vitamin because it is contained in solution in certain fats. It was first discovered in butter fat, then in egg yolk fat and cod liver oil, and later in green vegetables. It is found only sparingly in lean meats and the body fats of animals such as tallow and lard. It does not appear in appreciable quantities in any vegetable fats.

VITAMIN A is required for the maintenance of health in the adult and is indispensable in the diet of growing children. In fact, the unique value of milk and the leaves of certain vegetables is so significant in health and nutrition that they have been called the "protective" foods by McCollum. Whereas milk constitutes an important part of the diet of healthy people, both as a source of calcium and vitamin A, butter is the most important source of vitamin A for most adults. In recent years more attention has been paid to vitamin values. This

(Turn to page 603)

▶ Ill-founded consumer preferences for certain types of products not only disturb the orderly marketing of foods, but may actually constitute a menace through the development of incorrect dietary habits among consumers. Food manufacturers faced with such problems include the producers of

Bakery Products
Dairy Products
Fats and Oils
Flour and Cereal Products



End views of two Murphy quick-freezers installed at Deerfield Packing Co. plant. Each of these is five doors long.

Freezer utilizes direct contact with refrigerated metal surface and forced circulation of frigid air. Freezes either loose or packaged products.

New Method of Quick Freezing

VEGETABLES are quick-frozen by a promising new method at the Bridgeton, N. J., plant of Deerfield Packing Co. One of the largest companies of its kind in the country, Deerfield is freezing 5,000,000 lb. of green peas, 2,000,000 lb. of lima beans, 750,000 lb. of asparagus and varying quantities of spinach and broccoli. A unit of Seabrook Farms, Inc., the company distributes to hotels, restaurants and steamship lines. But it sells also to other distributors and to food processors, such as Campbell Soup Co., and H. J. Heinz Co.

The new system employed by Deerfield freezes a 3,200-lb. batch of vegetables in the fast time of one to one and a half hours when operating at a temperature of -30 deg. F. It freezes either loose or packaged products, is simple and requires no skilled labor. It can be built to any specifications and can be installed practically anywhere, since no foundations are required.

Known as the Murphy system, this method of quick-freezing removes heat from the product in two ways. One is through refrigerated metal with which the product or package makes direct contact. The other is through refrigerated air circulated over the product by a blower.

The construction of the Murphy freezer used at the Deerfield plant is shown in Fig. 1. It consists of a series of shelves on which pans of the product are set. The shelves are made up of tubes through which the refrigerant flows, but these tubes are rectangular in shape to give a flat, level surface. As may be seen in Fig. 2, the tubes are side by side with no space between. They are welded together on the bottom and spot welded on top. They are connected at the ends by mitered joints, also welded. This arrangement gives an almost unbroken flat metal surface, and it is estimated that 98 per cent of the bottom area of a tray containing the product is in direct contact with the cold tubes.

To provide a path for the circulation of air over the trays, the shelves are staggered endwise, as may be seen in Fig. 1. And air delivered under the bottom shelf winds its way upward, traveling in one direction over one shelf and in the opposite direction over the shelf above until it reaches the top. There it passes over three banks of round coils which carry refrigerant at the same temperature as that in the shelf coils. These remove the heat picked up by the air in passing over the product and prepare it for another circuit. The air is kept in motion by a blower with a capacity of 3,200 cu. ft. per minute.

The shelves and the air cooling coils are housed in a cabinet equipped with closely spaced doors. The cabinet may be of wood sheeting if the freezer is inside an insulated room, as it is at the Deerfield plant. But when the room is not insulated, the cabinet walls are lined with about 6 in. of cork.

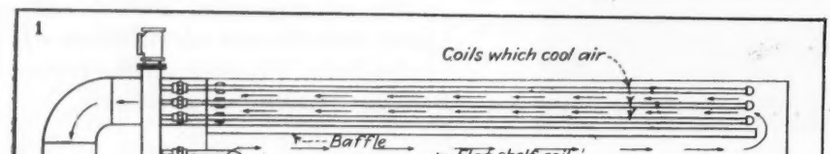
Since the installation was made at the Deerfield plant, a somewhat different design of Murphy freezer has been developed. Shown in Fig. 3, the shelves in this unit are not staggered to provide a path for the air. Instead, ducts distribute air to all the shelves at once, so that it flows in parallel paths. And by adjusting baffles, the amount delivered to different sections of the freezer can be varied to give different rates of refrigeration.

▶ ***Dealing as it does with a method of quickly removing heat from food products, this article is of value to:***

Packers of Fruits and Vegetables
Meat Packers
Fisheries
Ice Cream Manufacturers

This design also is different in that it uses a propeller type blower. This blower is less likely to have its efficiency impaired by frost than is the impeller type. Then, too, its capacity is much greater. It delivers about 32,000 cu. ft. a minute. But as this volume divides among the shelves, the rate of flow is not tremendously greater than in the other type of freezer. However, the air returns more quickly to the cooling coils.

Calcium chloride brine is the refrigerant used in the Murphy system at the Deerfield plant. Other cooling agents would do the work, but they have not the same ability to store cold. When no load is on the freezers, the compressors can be kept in operation to lower the temperature of the brine in the brine tank. This builds up a reserve of stored cold which lightens the load on the compressors when the freezers are filled. Deerfield operates its compressors at night to cool the brine to -35 deg. F. And at the end of a day's operations the temperature may be up to -28 deg. F. A refrigerating capacity of about 22 tons is required for each of the 320-tray freezers as used by Deerfield.



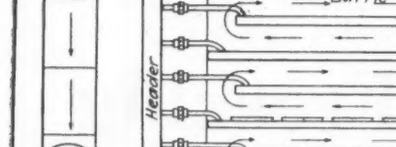
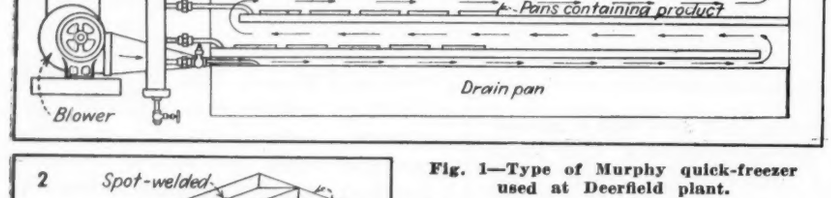


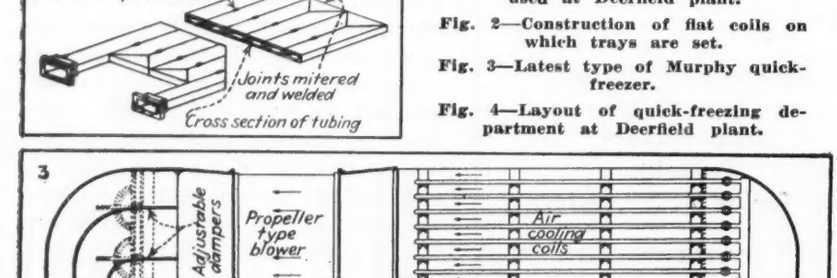
Fig. 1—Type of Murphy quick-freezer used at Deerfield plant.

Fig. 2—Construction of flat coils on which trays are set.

Fig. 3—Latest type of Murphy quick-freezer.

Fig. 4—Layout of quick-freezing department at Deerfield plant.





Defrosting, always more or less of a problem where refrigeration is used, is done quickly with the Murphy system. Warm brine at a temperature of 80 to 90 deg. F. is passed through the coils, and the frost disappears in about five minutes. As the frost melts, the water collects in a drain pan in the bottom of the freezer and passes off to the sewer. At the Deerfield plant, with four Murphy freezers, one is defrosted each day.

To operate a quick-freezing plant, something more than freezers is needed. There must be means of supplying material to the freezers and of taking it away. Deerfield has six freezers in one room, four of these being the Murphy units. The six are arranged in rows, two per row. As shown in Fig. 4, there are four power-driven conveyors in the room. Two of these, placed between the freezers, are portable so that they may be moved from one group of freezers to the other. All are built close to the floor so that the freezer doors will clear them when opened.

Filled trays are brought to the conveyors on a rack truck, which in turn is loaded from a conveyor passing through the wall between the freezer room and the tray filling room. One man operates the rack truck and loads the conveyors. Then two men working on each side of the freezers put the trays on the shelves, one placing them and the other handing them up. It takes fifteen minutes.

After freezing is completed, the trays are taken out again and placed on the conveyors. Then they move to the end of the room where their contents are emptied into chutes passing through the wall into the can filling room. The filled cans, usually 10-lb. fibre containers, are packed in cartons and conveyed to storage.

In addition to its use for freezing vegetables, as demonstrated by Deerfield, the Murphy system is being applied in an experimental way to the freezing of whole and filleted fish. This is being done at the plant of Brooklyn Bridge Cold Storage & Freezing Co., where a thorough study will be made of the relative merits of quick and sharp freezing as applied to fish. Ice cream, oysters, strawberries and cherries also have been processed by this system.

The Murphy system is the development of Edward J. Murphy, a refrigerating engineer for many years associated with Brooklyn Bridge Freezing & Cold Storage Co.

Taking "Bottle Necks" Out of A Production Line

Baker makes an average saving of 20 per cent in labor cost through carefully planned and applied methods of plant operation

By D. J. SADLER
Cost Auditor, Columbus Packing Co., Columbus, Ohio

"HOW can we cut our production costs?" has been a problem since industrial production began. Yet answers to it have been sought with as much effort and study during the past several months as though the question were a new one.

Material, supplies and labor costs have been rising steadily but market conditions do not permit a rise in the prices of finished products to cover these increased costs. Also, there can be no cutting in the quality of the finished products. Instead there has been a growing demand for products of higher quality at the prices commonly paid.

In the baking industry, particularly, this problem of meeting increasing costs became serious when the industry adopted 40 hours as the maximum work period per week for each man in the industry. Since that practice was adopted more than two years ago, various methods have been attempted to keep labor costs within bounds and to make savings throughout the plant to offset all increasing costs.

The method adopted by at least one successful wholesale baker was such that very little clerical work was required by either the plant or office employees. Yet the method kept waste, carelessness and lost motion under daily control. Its object was to remove all obstacles to low cost production activity. These obstacles are commonly known as "bottle necks in the production lines."

These "bottle necks" may be found in a single department where one operation such as mixing, bake oven operation, or product cooling slows up the activity of all other departments throughout the plant. Or they may be a series of details, minor in themselves, which taken as a whole keep production work on a low-speed basis or add a needless expense to plant operation. Also they may be a combination of both conditions.

▶ ***This article deals with a problem in management and plant layout which is likely to be found in any plant regardless of its size or the product produced.***

The methods outlined and the principles discussed have application in

All Food Manufacturing Industries

In bread baking the production line is called the "production schedule." This schedule is worked out daily by the production superintendent. It is based on actual orders received by the sales department and for that reason becomes the starting point in the daily working program of the bake shop.

This production schedule was also the platform upon which the cost auditor of this particular baking company had to build his campaign to win the fight for lower production costs.

BECAUSE the bake shop equipment was in operation before the cost auditor began his work, first attention was given to its layout and operation efficiency. No specific rules could be laid down to get the desired results with reference to the layout of the plant. The company operates several plants differing in size, floor-plan layout, and operating speed of equipment. Consequently no single plant could be taken as typical or as a model. Each had to be dealt with individually.

However, there were major factors common to all the plants which were used to determine the efficiency and effectiveness of the production line. They were: 1. Storage of raw materials and supplies; 2. Set up of the scaling and mixing rooms; 3. Organization of the make-up units, and their adaptability to the production schedule demands; 4. Capacity of the bake ovens; 5. Operation of the wrapping machines; 6. Analysis of costs.

The preferred manner of storing raw materials and supplies was determined by getting the best answers to the following questions: (*a*) When raw materials and supplies are received how much manual labor is needed to put them in the storeroom? (*b*) How much manual labor is needed to transfer them from the storeroom to points of use? (*c*) Is the storeroom large enough to hold a sufficient stock of materials-on-hand and in convenient shape for accurate stock inventory, as well as for removal from storage in order of receipt? (*d*) Is there any lack of trucks, skids, or shelves for convenient handling of raw materials or supplies?

Answers to these questions were obtained by making a time study covering the work for one week. The result was that delivery of materials and supplies was scheduled for a definite time in the stock man's daily routine except in case of an emergency. By following a definite schedule the stock man saved himself many trips through the plant, which had often required extra working hours, and gained time to do accurate stock recording and to keep his stock in convenient shape. Items in the stockroom were rearranged according to their frequency of use and weight. Those used in largest quantities were placed nearest to the storeroom entrance, to the elevator, or to the department in which they were used. A substantial saving in time

FORM NO.1 - BREAD WRAPPING FACTORS

_____ Plant Week Ending _____

		Standard	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Average	Previous Weeks Aver.
Total Units Wrapped	Crew No.1									
	Crew No.2									
	Crew No.3									
	Hand Wrapped									
Average Units per Hour	Crew No.1	1,600								
	Crew No.2	1,600								
	Crew No.3	1,350								
	Hand Wrapped	200								
Per Cent of Capacity	Crew No.1	67.00								
	Crew No.2	67.00								
	Crew No.3	67.00								
	Hand Wrapped	100.00								
Machine Pounds per Hour		700								
Total Wrapping Pounds per Hour		500								
Wrapping Cripples	Crew No.1									
	Crew No.2									
	Crew No.3									
Pounds per Man per Hour (Direct)		200								

Submitted by _____

was also made by putting the heavier materials close to the storeroom entrance. This arrangement cut down on the time required for rehandling and on the distance to be covered in movements to and from the storeroom.

The maximum load capacity was determined for each truck and skid.

The stock man was taught to keep a clerical record of his receipts and deliveries as each operation was completed. In this way guess work was done away with and the overstocking of departments with materials and supplies was stopped.

The scaling and mixing rooms were arranged so as to have the scaling of raw materials for doughs, fillings, or icings carried out as close to the mixers as possible. As a rule scaling rooms were formerly located in some part of the storeroom instead of near the mixing rooms. By having the scaling room near the mixing room there is a saving in time as well as an avoidance of mistakes on the part of the ingredient scaling man. This arrangement also permits an exchange or combination of duties which may be performed by either the scaler or mixer operator. Delivery of sugar, lard and similiar materials from the general storeroom to the scaling room in their original containers is much more efficient than is the weighing out of these ingredients in batch quantities for delivery from the general storeroom to the mixing room. One complete handling operation is eliminated.

In many cases one scaling operator can be scheduled during a single shift to weigh up enough ingredients for two shifts of dough mixers. In other instances he can help mix the sponges or doughs. With the scaling room near the mixing room the mixer operator also can do the scaling when the occasion demands.

Particular needs of the scaling and mixing departments are accurate scales and proper containers for the ingredients. Adequate supplies of scoops and measures are also necessary.

In organizing the make-up department special attention was given to the synchronization and coordination of the dividers, rounders, overhead proofers, molding machines, steam proof boxes and ovens. The efficiency of these units depends upon the compactness of the line up and the scheduling of doughs to keep them in as near continuous operation as possible. This means that the variety doughs should be run through in the order which causes the least number of changes or adjustments in the machines for the various sizes of loaves. Also provision must be made to have a sufficient supply of dusting flour, pans, and racks close at hand.

A TIME study was made to find a standard time for each variety of bread run and to get a comparison between machine speed and that of the operators working on twisting and panning of the loaves. In this way we were able to establish a ratio between the speed of the machine and the number of operators and to determine the capacity of the department in "pounds of bread per man per hour." In a number of instances the long established practice had been to increase the human labor factor in greater proportion than the slightly increased speed of machinery justified. An example of this error is found in the addition of a second panning operator when the speed of the divider was increased from 32 loaves per min. to 40 loaves per min. This means that the speed of the machine was increased only 25 per cent while the panning labor expense was doubled with neither operator having enough work to keep him busy.

Possibilities of such occurrences were avoided through a detailed study of the production schedule. With the help of the general production superintendent slight changes were made which placed the variety of breads in such relation to each other that production could move in a straight line schedule and with fewer machine changes. Other factors in the make-up department required detailed study to get rid of wasted efforts and lost motions.

Since the capacities of the ovens determine the speed of all other operations it is well to keep in mind the physical and chemical conditions which must be met to have the dough reach the ovens in proper condition for baking. The dough requires that:

1. The ingredients be mixed at specified temperatures; 2. It remains in a sponge or dough stage for a definite period of time in a fermentation room under controlled temperature and humidity conditions; 3. Sponge doughs have a proper fermentation period after their final mixing stage; 4. It be properly rounded after the dividing operation and given a chance to recover from the mechanical punishment by traveling through an overhead proofer or by being placed in a dry proof box for a definite period of time before being run through the molding machine to be made into a loaf shape; 5. It is held in the steam proof box until continued fermentation brings it up to the desired maturity and size for sending to oven.

As soon as the dough enters the oven it is subjected to controlled time and temperature conditions which will give the desired type of finished loaf. The time period is dependent upon both the temperature and the speed of the oven if the oven is of the traveler type as was the case in the bakery under discussion.

After the bread is taken from the oven it must be suitably cooled for slicing and wrapping. Variations in the size of the loaves affect the cooling time and cause adjustments to be made on the wrapping machine. Both of these factors have their effect upon movement of the bread along the production line.

CHANGES made in the production schedule took all of these factors into account. Lost motion along the line was eliminated by having each step fit into a routine position and by keeping the slack spaces in the oven capacity filled in. Through the elimination of lost motion arose the necessity of a change in the labor schedule.

One particular plant installation made use of a 55-ft. tunnel type traveling oven. A study of its operation showed that at the discharge end the working space for the operators was quite limited, and that the oven was stopped several times during the day by these operators to give them an opportunity to change racks, pans, and trucks. This handicap to continuous oven operation was overcome by installing a belt conveyor which extended to the outer edge of the oven. Bread coming from the oven was then emptied from the pans onto the belt by one operator who also took care of the lids and empty pans. The bread was carried by the belt to a gathering table from which it was placed on racks by a second operator who also lined the racks up in proper position in the bread cooler. Through this division of labor the operators did a minimum amount of walking and did not get in each other's way. Stopping of the oven was also eliminated. The belt was mounted on a portable stand fitted with casters that permitted it to be moved away from the oven when such products as sweet goods, rolls, or plain top bread are being baked. These products require only one operator at the end of the oven.

Control over the work done by the wrapping machine operators involved determination of the following factors: speed of the wrapping machine; time required to get the machine ready to run; and number of machine settings or changes required.

The work of these operators was speeded up through the use of a bulletin board. This board was placed in full view of the operators and on it was made a record of their work for each day. Immediately there was evidence of competition between the operators. "Standards of performance" were set and each wrapping machine crew endeavored to rate the highest from the standpoint of efficiency. In this way a saving of 30 per cent was made in the labor cost of wrapping.

IN addition to making changes throughout the plant for the removal of obstacles to efficient production activities, forms were worked out for keeping a record of shop activities. From these records is made an analysis of production costs based on pounds of bread per man per hour.

Form No. 1 covers the efficiency factors in bread wrapping. Data for the entry "Total Units Wrapped" are obtained by having each rack tagged in duplicate, giving the quantity and kind of bread items wrapped. The shipping clerk checks the contents of

FORM NO. 2 - WRAPPING ANALYSIS

Plant _____ Week Ending _____

Day	Date		Pounds Produced	Total Hours Worked		Machine only Lb. per Man Hr.
Sunday						
Monday						
Tuesday						
Wednesday						
Thursday						
Friday						
		Totals				

Time and Machine Lb. per Hr.

Sunday						
Monday						
Tuesday						
Wednesday						
Thursday						
Friday						
		Totals				

Time and Lb. per Hour-Total Wrapping

	Date	Pounds	Units	Hours	Value	Units per Hr.
Sunday						
Monday						
Tuesday						
Wednesday						
Thursday						
Friday						
		Totals				

Time and Average Units per Operator per Hour-Hand Wrapping Only

Girls Wrapping and Packaging

Total hours spent by girls only	
Total hours spent by men helpers	
Total	
Total Lb. hand made units	
Total value hand made units	
Labor cost hand made units (wrapping)	
Labor percentage, hand made units (wrapping)	
Average Lb. per operator per hour-Hand wrapping	

Submitted by _____

the rack, initials or corrects record on tags, and retains one of the tags. At the end of the day each crew turns in their rack tags at the office where they are checked by office clerks. Total units wrapped divided by total hours worked by each crew gives "Average Units Wrapped per Crew or Machine Hour." The office clerks total quantities of each variety wrapped on the machines by each crew and multiply by the finished weight of each loaf wrapped to get the total weight wrapped. This weight is then divided by the total hours worked and finally by the number of men in each crew to find the "Pounds per Man per Hour" wrapped on the machines during the day. "Total Wrapping Pounds per Hour" covers the weight of bread wrapped and the time spent on all wrapped products regardless of whether they are machine or hand wrapped. By dividing the total weight wrapped by the total hours spent on wrapping operations the "Total Pounds per Man per Hour" is obtained.

The entry "Wrapping Cripples" covers the quantity of all loaves damaged by the wrapping operation. This entry is checked by the foreman. It has a mental effect upon the operators which is an important factor in lowering the number of cripples.

"Pounds per Man per Hour (Direct)" is a labor factor derived from the capacity of the equipment, amount of hand bench work done, and the number of operators required for efficient operation. It is a measure of lost motion elimination, coordination of operations and supervision. Direct shop operators show keen interest in this factor and, as a rule, try to maintain it at an efficient average figure.

From Form No. 2 is obtained an analysis of the production performance in the wrapping department for the determination of daily and weekly labor costs.

Machine wrapping performance is represented by the column headed, "Machine Only Lb. per Man Hr." This index is obtained by dividing "Pounds Produced" as given in the production reports by "Total Hours Worked" according to the time cards.

"Hand Wrapping and Packaging" performance is obtained by dividing total number of hand wrapped units by number of hours worked. The index is given in "Average Units per Operator Hour."

"Total Wrapping Pounds per Man Hour" is the index of performance obtained by dividing the total of pounds wrapped by hand and by machine by the total number of operator hours.

These indexes serve as a basis of production costs comparison and a measuring stick of department efficiency.

To get "Labor Cost Control of Payroll Comparison" both "Direct Shop Labor" and "Indirect Shop Labor" have to be taken into account. This is so because cost accounting records show labor divided into these two classifications. That means that the activities of each individual on the payroll must be analyzed and his wages tabulated under the proper heading in "Payroll Accounts." Once these two types of labor activities are established it is important that their costs be controlled as closely to production as possible and that the help be regulated in such a way as to have accurate cost recordings at all times.

FORM NO.3 – PAYROLL COMPARISON

_____Plant

	Week Ended		Week Ended	
Account No. 101	$	%	$	%
202	$	%	$	%
203	$	%	$	%
205	$	%	$	%
206	$	%	$	%
207	$	%	$	%
503	$	%	$	%
Totals				

Total Production Value _____

Finished Baked Weight _____

_____

FORM NO.4 – LABOR COST TICKET

_____Plant Date_____

Product_____

Weight_____ Wholesale Selling Price_____

No. of Operat's.	Operation	Time	Cost	Labor Per Cent	Lb. per Man Hr.
	Mixing and Scaling				
	Divider and Make-up				
	Pan Greasing				
	Oven				
	Finishing				
	Wrapping				
	Totals				

THIS "Payroll Comparison" (Form No. 3) is a weekly guide in finding unusual increases in labor costs and what production problems must be solved to improve the control over labor costs. Account No. 101 is the labor cost of handling flour from the freight station as this particular plant had no railroad siding. This item is an indirect labor cost.

Account No. 202 is direct shop labor which performs specific operations controlled directly by production activities.

Account No. 203 is miscellaneous shop labor of the indirect type.

Account No. 205 is wrapping labor of the direct type.

Account No. 206 covers firemen

(*Turn to page 603*)

Negro Market Merits More Attention

More than five million city Negroes spend more on food than income indicates. And they eat something beside cheap brands.

By PAUL K. EDWARDS
Martinsville, Ohio

ONE of every ten persons in the United States is a Negro. This means that food manufacturers should be completely familiar with the market possibilities of the Negro race. So far, however, almost no attention has been paid to this class of consumers. As a result, ideas concerning it are very vague and uncertain, and, unfortunately, greatly in error. This applies to quality and quantity of foods purchased, preferences for brands and the reaction to advertising and other promotional efforts.

Manufacturers generally think of the domestic market as being more or less uniform in its characteristics. And they develop promotional and selling programs on the basis of broad income divisions. This is the same as saying that racial, occupational and psychological differences are not important.

It is a comparatively simple matter to divide the market on the basis of income. Moreover, such a division makes possible promotion by the purely American "mass approach" system. That is, the use of a single, broad, generalized promotional scheme to reach all races and occupation groups. Needless to say, when the markets are divided on the basis of income, Negro communities always appear within those areas giving least promise. And therein lies an error.

The consumer demands of rural and urban Negroes differ greatly; as much, in fact, as those of different races. But the cash purchasing power of the Negro farmer is not very important. Moreover, his demands are much simpler than those of his city brother. So this article will be limited to a discussion of the urban market.

Of the 5,200,000 urban Negroes in the United States (1930 census), about 3,000,000 live in the South and 2,200,000 in the North and West. Eighty cities each contain at least 10,000, and seven of these have more than 100,000. In 39 of them, Negroes make up more than 25 per cent of the inhabitants.

Judging by ordinary market yardsticks, this population provides a cheap, unimportant market. In the first place, 70 to 80 per cent of urban Negro families belong in the common-labor or semi-skilled labor group. Secondly, nearly 100 per cent of the families have cash incomes under $1,200 a year. In fact, the average annual income is estimated at no more than $750.

Acme

Sidewalk market in world's most densely populated Negro section, Harlem, New York City.

Two further observations, however, show that this market is more important than one would judge on the basis of occupation and income:

1. The urban Negro eats certain foods in large quantities, and his home is, relatively speaking, one of the largest markets for such foods as flour, baking powder, fats, corn meal, rice, grits and such other heavy staple foods as meats, potatoes and butter. The diet of the Negro everywhere is similar in general to his diet in the South, because most of the Northern families or their ancestors, came from the South. And the Negro eats heavy foods if for no other reason than that nine times out of ten he is engaged in heavy physical labor.

2. It is a mistake to assume that a Negro community offers a market only for cheap foods. This has been discovered through interviews with hundreds of Negro housewives and with many grocers serving them, as well as by direct analysis of actual food purchases. In 1929, for example, urban Negro labor families used more of the medium and high-priced baking powder, flour, coffee and butter than they did of the less costly grades.

A comprehensive survey of food consumption in urban Negro neighborhoods was made in the late months of 1935. In connection with this, records were kept on a Saturday in October of actual purchases made by Negro customers in a limited number of stores in two Southern and

► A true picture of the food consuming habits of the Negro is a subject of importance to

All Food Manufacturers

one Northern cities. These stores were representative of those doing the major volume of the grocery business in the Negro neighborhoods. Among the findings are the following:

1. Two hundred and thirty-eight customers bought standard creamery package or tub butter; 2 bought the less expensive country butter; 38 purchased butter substitutes.

2. Four hundred and fifty-four, or 55 per cent, of 826 purchases of meats were in a medium-price range of about 21 to 30 cents a pound; 290, or 35.1 per cent, were made at prices ranging from 6 to 20 cents; 82, or 9.9 per cent, at prices from 31 to 45 cents.

3. One hundred and fifty, or 75 per cent, of 200 purchases of coffee ranged from 15 to 19 cents a pound; 50, or 25 per cent, from 23 to 33 cents.

4. Two hundred and twenty-four, or 78.3 per cent, of 286 pounds of fats were of lard and compounds costing from 13 to 16 cents a pound.

5. In the chain stores included in the inquiry, the less expensive private brands of flour dominated purchases for all classes of Negro families. The prices paid by most ranged from 50 to 55 cents for a 12-lb. bag. In independent stores, the majority of purchases consisted of the higher-priced, old-line standard brands ranging from 61 to 70 cents for 12 lb.

6. In the purchases of baking powder, inexpensive brands selling at about 1 cent an ounce were important. At the same time, however, a significant number of medium-priced brands were bought. In many instances, purchases of the higher priced baking powders were of the very small packages (3 and 4 oz.) selling at 10 cents.

These findings do not at all indicate a clear cut demand for foods in the higher-price brackets. But they do show a definite interest in quality.

Perhaps the occupation of the Negro has the most influence on this trend in his food purchases. About one-fourth of the men and three-fourths of the women gaintully employed go each day into the homes of the middle-class or wealthy white families as domestic servants. Or they are employed in hotels, dining and Pullman cars, stores and other commercial establishments. So during working hours many Negroes come in contact with quality foods and with social and cultural life of a higher standard than they otherwise would know. And it is reasonable to expect that they gradually raise the standards of living in their homes to a point above what would be expected for their economic level.

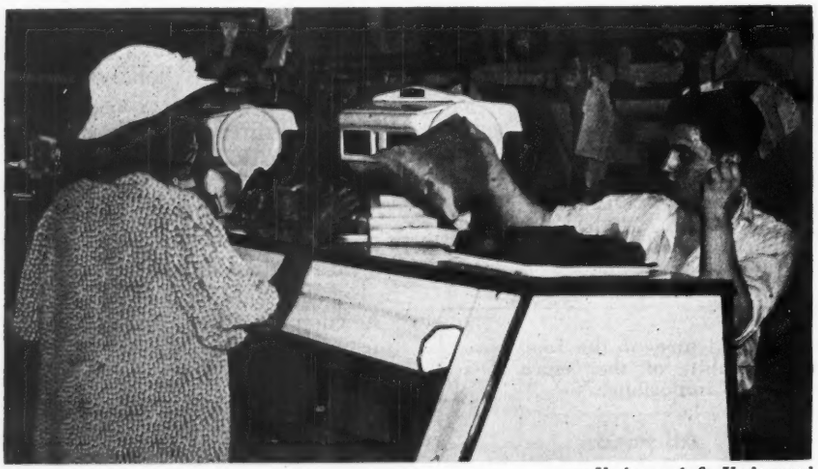
It might be reasonably asked how the Negro labor home, with its income of $1,000 a year or less, can buy the quantities and qualities of food indicated. The answer involves no mysteries. The varieties of food consumed are, as a rule, drastically limited. Large quantities of such inexpensive, but wholesome, foods as corn meal, rice, grits and greens, cooked with salt pork, are eaten. Another explanation is that many Negro families really receive more than their cash incomes indicate. Domestic servants usually obtain at least part of their meals on the job, frequently they are allowed to take certain left-over foods home, and they generally receive carfare to and from work. Still a third factor is that Negroes sacrifice certain expenditures so that they may buy more food. Recent studies of the Bureau of Labor Statistics indicate that the urban Negro family spends comparatively more on food than do white urban labor families with incomes from $500 to $1,500 a year.

Since there has been a lack of complete understanding of the demands of the Negro, perhaps manufacturers also are at fault in their ideas concerning other racial and occupational groups. Increasing competition may sooner or later force producers to obtain a better understanding of the consuming traits of these classes.

Some may argue that a more detailed approach to the consuming market would lead to more expensive selling. But that is not necessarily true. It might very well lead to more effective, and consequently less expensive, merchandising.

Underwood & Underwood

Delicatessen in Harlem. Operated by a white proprietor, this store is patronized almost exclusively by Negroes. It carries an extensive line of packaged foods.



Underwood & Underwood

Meat market in Harlem. Good quality meats are displayed in white-enameled refrigerated show case.

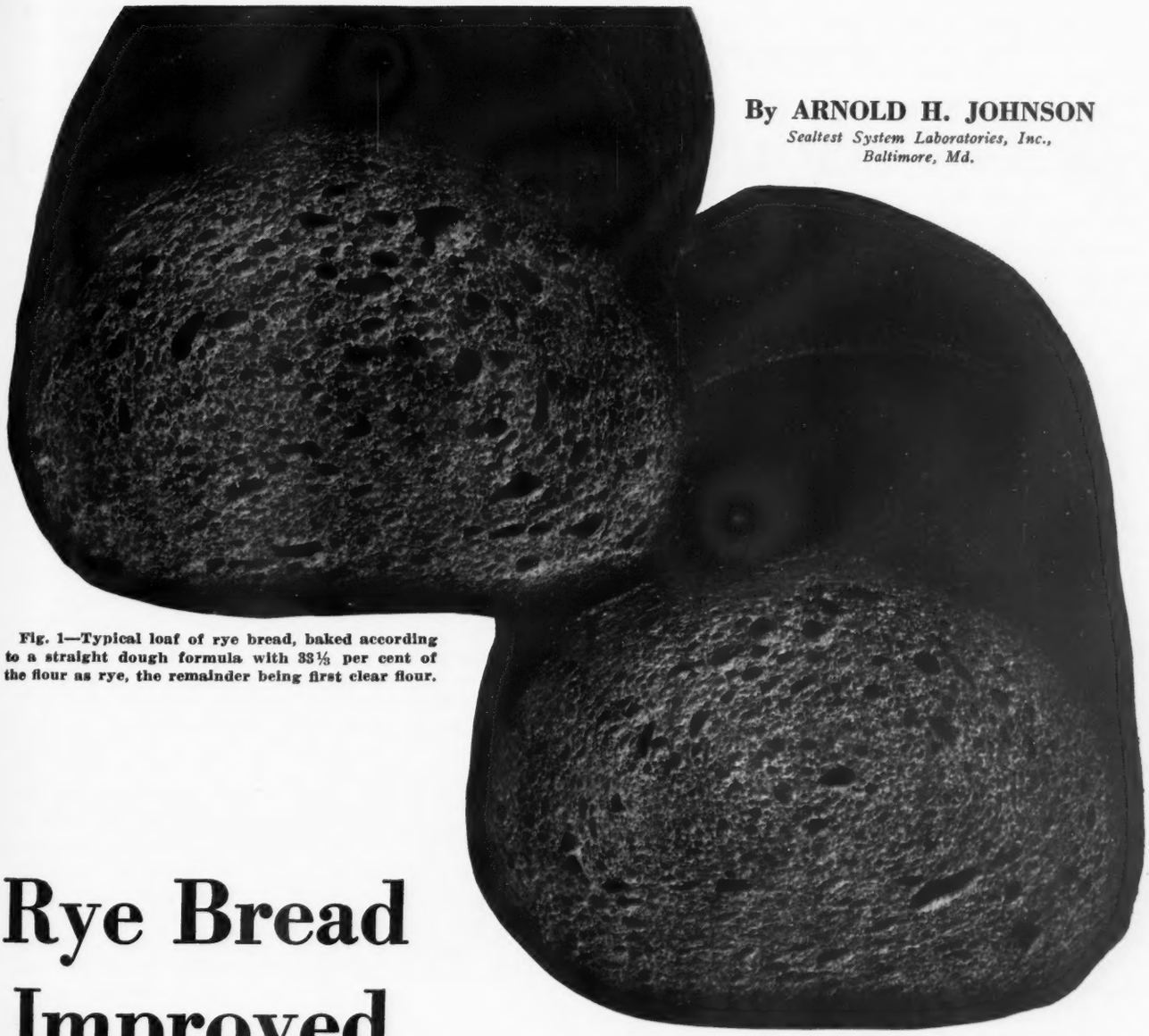


Fig. 1—Typical loaf of rye bread, baked according to a straight dough formula with 33⅓ per cent of the flour as rye, the remainder being first clear flour.

Rye Bread Improved

Ready Mixed Buttermilk-Rye Flour Assures Uniform Acidity of Dough

By ARNOLD H. JOHNSON
Sealtest System Laboratories, Inc., Baltimore, Md.

Fig. 2—Rye bread baked in the same way as that shown in Fig. 1, but with ready mixed rye-buttermilk flour in place of rye flour.

BAKERS have long known the value of buttermilk or buttermilk powder as an ingredient of rye bread. Yet many have not used it, for they have found it difficult to control the acidity of the dough when so doing. This trouble came from variations in the buttermilk ingredient. And when the dough acidity varied from batch to batch, the bread made from the dough also lacked uniformity.

The difficulty has now been overcome as a result of experimental work carried out by the Ward Dry Milk Co., St. Paul, Minn., over a period covering the past year and a half. This work resulted in the development of a ready mixed buttermilk-rye flour that has provided a method of controlling shop production, obtaining uniformity, and simplifying the manufacture of rye bread. The Ward Dry Milk Company has recently announced its entry into the milling field. It will manufacture a rye flour containing a fixed percentage of buttermilk. This is thought to be an innovation, no ready mixed flour of this type having been previ-

▶ ***Through the joint efforts of the dairy industry and the flour milling industry, bakers have been provided with an improved flour for the making of rye bread. This article tells the results of these experiments and will be useful to manufacturers of***

Bakery Products
Dry Powdered Milk
Prepared and Ready Mixed Flours
Rye Flour

ously available on the general market.

The annual production of rye bread in the United States is close to 1,500,000,000 lb. Consequently, any development that promises improvement in the production of this important food product is of much interest. Therefore, I should like to describe for you, here, the experiments that led to the development of the new buttermilk-rye flour, and the results discovered in these experiments.

PRELIMINARY baking experiments were carried on at the University of Minnesota, using various mixtures of medium rye flours and various buttermilk powders. The effort was to find a formula that would suit the majority of bakers. The combination of rye flour and buttermilk powder which gave the best results had the following composition:

85 lb. medium rye flour

15 lb. of 11 per cent acid buttermilk powder.

This mixture was used in straight dough baking tests in such quantity that the rye flour made up 33⅓ per cent of the total flour. The percentage of rye flour was higher than that used by most bakers, although some special rye breads do contain more than a third part of rye flour. The U.S. Government definition of rye bread originally called for one-third of the total flour to be rye flour. At present, however, there is no official definition of rye bread. Accordingly, the baker can use as much, or as little rye flour as he wishes in his formula.

In the straight dough baking tests, using the 85-15 rye flour and buttermilk mixture, the following formula was used:

First clear flour	180 gm.
Rye flour and buttermilk mixture (90 gm. medium rye floor and 13.5 gm. acid buttermilk powder)	103.5 gm.
Shortening (based on the flour)	2.7 gm. or 1%
Malt (based on the flour)	2.7 gm. or 1%
Salt (based on the flour)	5.4 gm. or 2%
Yeast (based on the flour)	5.4 gm. or 2%
Water (based on the flour)	176 cc. or 65.2%

Note: The doughs that contained rye flour only, without the acid buttermilk powder, showed water absorption of 60.7 per cent.

These experimental doughs were mixed for one-half minute in a mixer, and handled easily. Care had to be taken, as rye flour may be ruined by too severe mixing. The dough came from the mixer at 82.5 deg. F. and went to the fermentation chamber at that temperature. During fermentation, the dough was punched at the end of 90, 50, and 10 minutes. Next, the dough was made up into loaves and proofed for 40 minutes. These loaves were baked for 30 minutes at 440 deg. F. on a stone hearth.

Using this procedure, it was found that bread made with the rye-buttermilk flour was superior in many respects to that made without the acid buttermilk powder. This was especially so as to flavor. External and internal character of the bread was also improved, the crust having a richer bloom, and the structure and texture of the crumb being more regular. Crumb color was also brighter. Moreover, the bread made from the rye flour-buttermilk mixture kept fresh longer than the other bread made from the regular formula.

Following these experimental tests, commercial tests were carried out under normal production conditions. These tests were made at the Albert Lea Baking Co. plant, Albert Lea, Minn., where the rye flour-buttermilk mixture was used in regular production. Here the new ready mixed flour was added to the regular rye bread formula used in the plant.

Here, again, the quality of the rye bread was found to be improved by the use of the new flour. The greatest improvement was flavor, but the improvements noted in the laboratory experimental tests were also observed. In addition, it was noted that the new bread behaved better in the slicing machine, not being so crumbly as the regular rye bread.

USUAL practice in making rye bread at the Albert Lea plant was to take enough of the white bread sponge to meet the day's rye bread production schedule, and add rye flour and a second clear flour to it. The rye added to the sponge constituted about 20 per cent of the total flour. The sponge used was prepared as follows:

Flour	100 lb.
Yeast	1 lb.
Water	73 lb.

This sponge was allowed to stand for about four hours at 75 deg. F. Then additional water, the rye-buttermilk flour, and the second clear flour were added to form the dough. The dough was mixed until a temperature of 80 deg. F. was reached. It was then placed on the bench for twenty minutes. Next the loaves were formed and proofed rapidly, using plenty of steam in the proof box. The proofed loaves were baked in the usual way. No shortening was used in the Albert Lea formula. Ground caraway was added at the dough stage, to supply the flavor required by the local market.

A formula recommended by the Ward Dry Milk Company was also tested as follows:

Sponge—4 hours at 75 deg. F., mixing time 3½ minutes.

Rye-Buttermilk flour	80.0 lb.
First clear flour	43.0 lb.
Arkady (yeast food)	0.5 lb.
Yeast	1.875 lb.
Water	104.0 lb.

Dough—30 minutes at 78 deg. F., mixing time sufficient to bring to temperature.

First clear flour	88.0 lb.
Salt	4.5 lb.
Malt	2.0 lb.
Shortening	1.0 lb.
Caraway (may be varied to suit taste)	4.0 lb.
Water	46.0 lb.

Under the recommended formula, water absorption and fermentation can be varied to fit local conditions. It is difficult to fix on one formula that is suitable for all bakers and all communities. For each locality there is a type of rye bread which finds greatest favor among consumers.

Rye-buttermilk flour has also been used with complete success in other formulas than that given. One large bakery merely substituted it for the rye flour it had previously used, increased the water absorption, and proceeded to bake rye bread of improved flavor and with the other improved characteristics that have been mentioned.

To illustrate the effects which the use of this new ready mixed flour has on the loaf, compare the two photographs that are shown with this article. Fig. 1 is typical of a regular rye bread using the straight dough procedure with 33⅓ per cent of the flour being rye flour, the rest being first clear. Fig. 2, shows a rye bread made the same way, but containing the ready mixed rye-buttermilk flour instead of the regular rye flour. The finer texture and lighter color of the bread in Fig. 2 is apparent. However, some bakers might prefer a bread with a coarser texture than this. In that case, by using more rye in the baking formula, a coarser texture and darker color is easily obtained.

IT IS worth noting that the greater water absorption obtained by using the ready mixed rye-buttermilk flour, compensates for the extra cost of the new flour. For every pound of buttermilk powder used in the batch, one more pound of water can be added.

Sales Territory Broadened By High Speed Transport Trucks

Bakery uses heavy duty trucks to take loads from plant to secondary distribution points where light trucks pick up loads for retail route delivery

AN increased sales area for its bread and baked goods has been secured by the Cortland Baking Co., Cortland, N. Y., through the use of high speed, large capacity transport trucks. These are each capable of carrying 5,500 loaves of bread. In place of having small local plants which could not compete in the cost of unit production with the company's two large bakeries at Cortland and Corning, N. Y., these transport trucks permit direct daily deliveries to more distant cities. From these points smaller trucks are operated to retail outlets in the neighborhood.

Out of the Cortland plant, goods are shipped to Auburn for one route; to Syracuse for four routes; to Oneonta for five routes; and to Binghamton for two routes. From the Corning plant Corning, Elmira, Waverly, Sayre (Pa.), Towanda (Pa.), Canton (Pa.), Troy (Pa.), Bath, Penn Yan, Hornell, Dansville, Wellsville, Wellsboro (N. Y.), and Blossburg (Pa.) are covered with all intervening territory.

▶The method of delivery of perishable food products described in this article has solved a problem for Cortland Baking Company. A similar method or some modification of it might prove useful to manufacturers of such products as

Bakery Products
Confectionery
Dairy Products
Ice Cream
Mayonnaise
Meat Products

On each night of the week except Friday, when Saturday's increased business requires the use of two trucks, the Cobakco transport described in this story leaves the Cortland plant at 11 p. m., drops off two loads in Binghamton, 42 miles away, and then runs approximately 62 miles to Oneonta, where its remaining five retail loads are unloaded. Aside from its large load capacity of 5,500 standard size loaves of bread, the body of this truck is notable for its modern design. It is well proportioned as to length, width and height. These dimensions have all been chosen in proper relation to the hood and the de luxe cab of the high speed 5-ton Brockway truck which is used.

One of the principal features of the design is the contour of the body exterior. The front is sloped gracefully down to a line that is level with the top of the cab. The rear is sloped from top to bottom to avoid the otherwise box shape of the rear end. All corners are smoothly rounded in streamline fashion to enhance the appearance and help reduce wind resistance, which in a body of this size has some effect in reducing speed

Three-quarter rear view of the Cortland Baking Company's 5,500 loaf bread transport truck, showing the proportions of the body, the sloping rear with lettering set off by reflector buttons, the two-part rear opening, the rear wheel shrouds, and the side tray compartments.

when the truck is driven over open country roads in excess of 40 miles per hour.

The body is 22 ft. 7 in. long; 8 ft. wide; and the clear height inside is 6 ft. 9 in. The total length of the complete truck is 32 ft. from front bumper to the back of the sloping rear end.

The high side height, from the apron flush with the cab running board to the top of the roof, is broken by a belt panel marked by moldings at top and bottom. This further improves the appearance. These moldings are curved at both ends to swing into the moldings which outline the upper side panels.

Each side panel is made of a single sheet of high strength aluminum alloy, without seams. This provides a smooth surface for lettering. The construction also gives light weight combined with adequate strength. All the moldings are of aluminum, attached with invisible fastenings.

Another feature of the design from the standpoint of appearance is a motor-bus type of sunken sign at the front of the body above the cab. This bears the word "Cobakco," coined from the company name, Cortland Baking Co.

Still another feature of the appearance is the use of reflector buttons within the outlines of the words "Cobakco Bread," painted on the rear of the body. These shine at night in the same manner as the familiar highway signs at danger points, and draw the attention of operators of overtaking vehicles to the company product.

Taken all in all, no expense was spared in the design of the outside of the body to give the best appearance and thereby obtain the fullest advertising value and customer acceptance for the company's product. Again to attract favorable comment, the body is painted in the standard Cobakco colors. These are three shades of red, with a contrasting belt panel in blue, and full gold leaf lettering.

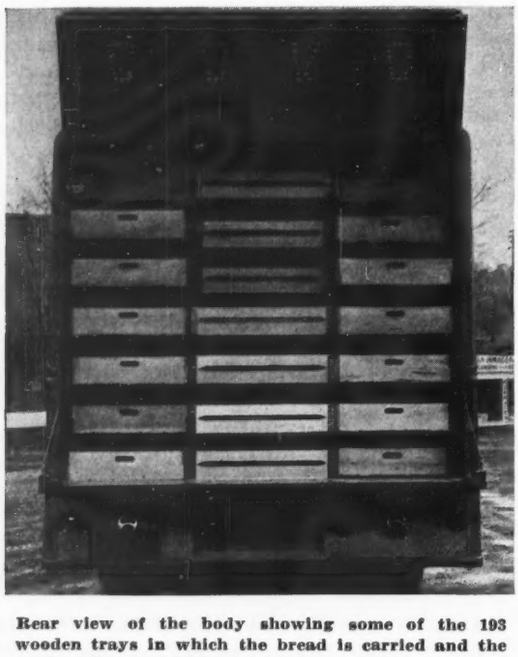
The body is also fully equipped from a safety standpoint. Three green clearance lights are provided on each side. There are also legal clearance lights and reflectors front and rear, and two combination tail and stop lights.

Other safety equipment includes twin windshield wipers and mirrors; a hot water heater and windshield defroster; and a special sanding device operated by the exhaust to provide traction for the rear wheels on icy roads. Towing hooks are also mounted at front and rear.

The rear door is of novel construction. It consists of a two part folding upper half and a swing-down lower tailgate. The upper half folds along a horizontal line and lifts upward by means of a spring mechanism controlled by hydraulic snubbers. All the door joints are closely matched and overlapped to prevent dust or moisture getting into the body.

The inside design of the body, to carry a 5,500 loaf load, is also unusual. As shown in the accompanying illustrations, the bread is carried in 163 trays, each holding 30 loaves, and 30 trays each holding 20 loaves. The trays are arranged in three vertical rows across the body, except for five 20-loaf trays carried in weather-tight compartments in the body skirts, on each side.

All the trays are carried on steel racks. This prevents any crushing of the load in transit, and permits a free circulation of air around each tray.



Rear view of the body showing some of the 193 wooden trays in which the bread is carried and the steel racks on which the trays are held. Note the position of the upper half of the rear door, and the lowered tailgate and step beneath for ease in unloading.

Three-quarter front view of the Cortland Baking Company's 5-ton Brockway truck and its bread transport body. Note the front end lines with bus type sign over the cab, the safety side marker lights, and the panel design and lettering layout.

Researches That Made Gas Storage Possible

Part III

By NEIL R. FISK
London, England

FOUR important aspects of the problem of what goes on when meats are stored under gas have been recognized by various research scientists:

1. Effect of cold on micro-organisms.
2. Effect of cold on meat.
3. Effect of gases on micro-organisms.
4. Effect of gases on meat.

In utilizing the results of these researches to prolong the merchantable life of meat it is very important that the quality of the meat be maintained uninjured. In Parts I and II of this series (August and September, 1936, FOOD INDUSTRIES) the first two aspects of the problem have been reviewed. In this installment the last two aspects will be covered.

A very considerable mass of data concerning the influence of gases, particularly carbon dioxide, on the development of micro-organisms has been accumulated in the last few years.

An investigation has been carried out by R. B. Haines[25] in which he employed counts of living bacteria to show the influence of CO_2 on the rate of multiplication of certain bacteria. He was able to demonstrate that the generation time (the average length of time in which one organism becomes two) of *Pseudomonas* and *Achromobacter* is increased by about one-half at 28 deg. C. by a 10 per cent, or a 20 per cent concentration of CO_2. This means that bacterial growth is about 50 per cent slower in the CO_2 atmospheres. The effect is more marked at lower temperatures, the generation time being more than doubled at 0 deg. C. in an atmosphere containing 10 per cent of CO_2. *The maximum number of organisms developed is unaltered by the gas, but the time taken to reach the end-point is doubled.* This is important.

Ten per cent of CO_2 is as effective as 20 per cent in inhibiting the growth of *Achromobacter* at 0 deg. C., but is not so efficient at 4 deg. C.

▶ ***In this article, Mr. Fisk continues to review the scientific discoveries underlying the British practice in gas storage of meats. This time the subject is the effect of gases on micro-organisms and on meat. Gas storage has an important part to play in the future of***

Meats **Nuts**
Fruits **Eggs**

Contrary to statements made by other investigators,[26] Haines did not find any evidence that this could be accounted for by a change in pH caused by the CO_2. He suggests that the explanation may be that the gas affects the dehydrogenating enzymes of the cell.[27]

A comprehensive investigation of the inhibition by carbon dioxide of the growth of the fungi commonly found attacking meat is reported by R. G. Tomkins.[28] He inoculated Petri dishes containing nutrient agar with spores of molds from infected meat. These were placed in desiccators in atmospheres containing CO_2 at three concentrations, 10 per cent, 20 per cent, and 30 per cent, and also one without the gas. Comparable samples were kept at 0, 5, 10, 15, 20 deg. C.

It is pointed out that in order fully to define the effect of an external factor on germination of molds, three criteria are necessary:—

I—The latent period of germination, i.e., the average time taken for germ tubes to appear;

II—The percentage of germinated spores at the end of the experiment;

III—The rate of elongation of the germ tubes. The first of these is perhaps the most important. Observation at frequent intervals showed that:—

I (a) Co_2 does retard germination.

I (b) Temperature has a definite effect on the latent period, and the relative retardation produced by a given concentration of CO_2 is greater at low temperatures than at high. Consequently, lower concentrations of the gas are needed to inhibit germination at lower temperatures.

I (c) The increase in the latent period is not directly proportional to the concentration of CO_2; at higher concentrations the effect becomes increasingly marked. The conclusions of Brown[29] are supported by these observations.

II In most cases the final percentage of spores which succeed in germinating is unaltered. But, at those temperatures and concentrations of the gas where the latent period is most retarded, germination is often irregular, vigorous germ tubes being produced by some spores and none at all by others.

III (a) As reported by Brown[29] the rate of elongation of the germ tubes is definitely reduced by CO_2. The presence of the gas causes irregularity in growth and also branching of the germ tubes; at high concentrations the latter are short and repeatedly dichotomised, i.e., forked. This was also observed by Brown.

III (b) Lower concentrations of CO_2 are needed to inhibit growth at low temperatures than at high.

III (c) The first exposure to the influence of the gas seems to cause a greater reduction in growth than later additions.

III (d) Growth is more affected than germination by CO_2. At some temperatures and concentrations of the gas, the spores germinate but fail to grow, and the rate of growth of a colony is more retarded at a given temperature and concentration of the gas than is the germination rate.

The manner in which CO_2 achieves this retarding action on germination and growth is at present quite unknown. As has been said previously, the phenomenon is not thought to be due entirely or even chiefly to changes in pH. Repeated experiments showed that the maximum change in pH was no more than approximately 1.2 units; in a particular case, from pH 5.7 to pH 4.5. Justification of this opinion was provided by an experiment in which the pH was artificially lowered by hydrochloric acid in the absence of CO_2; there was no marked effect on the growth of fungi. Even when the pH was depressed to a figure lower than it ever is by CO_2, the reduction in growth rate, although it was more marked, was never so great as that caused by CO_2 in a concentration of 20 per cent.

The effect in this case is, moreover, different in nature as well as in degree as, although the growth rate is reduced by the artificial change in pH, the germination time is unaltered.

Finally, oxygen concentration within wide limits was found to have no effect on the retarding influence exerted by CO_2.

The effects produced by other substances were investigated for purposes of comparison. Chloroform was found to reduce growth by a constant amount proportional to the concentration, but it did not noticeably increase

the latent period of germination. Acetaldehyde increased the latent period, but the growth rate of the fungus did not remain constant. A further difference is that the retarding influence in the case of CO_2 is not affected by the size of the bacterial colony, whereas with acetaldehyde it is.

Carbon dioxide more nearly resembles ammonia in its action; the latter is a substance which, like CO_2 on dissociating in water, produces physiologically active ions.

Time of exposure seems to have no marked effect on the growth rate of an organism in a given concentration of CO_2, and a noteworthy fact is that the increase caused by the gas in the latent period of germination is sufficient to increase considerably the time required for the colony to reach a given size.

Living systems are influenced in several different ways by carbon dioxide; the uptake of ions is changed,[30] and the respiration is depressed.[31] The manner in which carbon dioxide retards growth is not understood, however, and is still under consideration.

Work bearing directly on gas storage is reported by Moran, Smith and Tompkins[32] in a paper entitled, "The Inhibition of Mould Growth on Meat by Carbon Dioxide." They point out that a high proportion, say 50 per cent of CO_2 in the atmosphere necessarily means a considerable dilution of the oxygen, and after a short period of storage in such an atmosphere, muscle turns brown owing to the conversion of haemoglobin into methaemoglobin[33] and fat is bleached. Another point to be remembered when storing meat at low humidity is that loss in weight and withering of the surface occurs in such circumstances.

In the experiments referred to, pieces of lean beef about 1 lb. in weight were suspended in 10 litre gas tight jars filled with air containing various proportions of CO_2 and kept at 1 deg. C. Infection was accomplished by spraying with an aqueous suspension of spores of the mold *Thamnidium chaetocladioides*. Mold first appeared in eight to nine days in an atmosphere containing no CO_2; 10 per cent of the gas slowed down the growth rate in the early stages to about one-half, while 20 per cent effected almost complete inhibition of the growth of the mold. In actual fact, no growth was observed after nineteen days.

In order to prove that this result was due to a specific action on the part of the carbon dioxide and not merely to a diminution in the partial pressure of oxygen, the experiment was repeated with the CO_2 replaced by nitrogen, when it was found that increasing amounts of nitrogen seemed actually to encourage growth.

Supporting results already described above, it was found that pH was hardly affected; beef stored for nineteen days in an atmosphere of pure CO_2 had a pH of 5.4, compared with 5.6 to 5.9 for ordinary beef. This small change is insufficient to account for the increase in tenderness observed in these experiments. No difference in tenderness could be found between meat hung for one week in ordinary air and meat stored for three weeks in an atmosphere containing 20 per cent of CO_2.

An interesting observation was that yeasts and bacteria grow more freely than molds on the surface of lean meat in a 20 per cent CO_2 atmosphere.

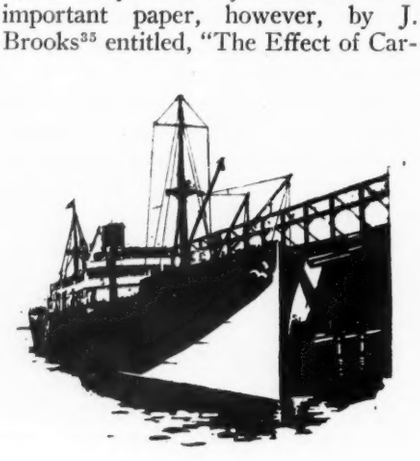
The growth of the mold investigated was shown to be inhibited also on connective tissue and on fat, but not to so marked an extent as on lean muscle.

The growth of bacteria on legs of lamb was shown to be strongly inhibited by concentrations of CO_2 between 10 and 20 per cent.

A detailed bacteriological investigation has been carried out by F. M. Christyakov[34] and reported in a paper, published in Russian, entitled, "Action of Carbonic Acid on Putrefactive Micro-Organisms." He showed that CO_2 is a powerful agent in the preservation of meat, amongst other foodstuffs, and of 37 different kinds of putrefying bacteria studied, only five proved to be unaffected by the gas.

The Effects of Gases on Meat

The changes induced in meat by exposure to gases have received much less attention than the other aspects of this subject already discussed. One important paper, however, by J. Brooks[35] entitled, "The Effect of Carbon Dioxide on the Color Changes or Bloom of Lean Meat" must be referred to, and his results are well worth summarizing. He points out that the reddish color of fresh lean meat is due to the pigment, muscle haemoglobin, found in the muscle fibres. The depth of color depends on the concentration of the pigment and the transparency of the tissue. The first itself depends on the breed, age and condition of the animal, varying even in different muscles of the same animal. The second factor, opacity, is generally altered by loss of water.



Fresh lean meat, hung in air, contains pigment in two forms, oxyhaemoglobin (red) and reduced haemoglobin (purplish). The penetration of oxygen into the muscle is confined to the surface layer, and it is thus clear that color depends on the thickness of the oxygenated region. If this is considerable, the "transparent" region is a bright red, but if it is not so thick, it will be a purplish red.

Very considerable differences in the depth of penetration of oxygen may be observed. In a particular instance investigated, the penetration by oxygen of muscle tissues taken from the same ox and hung in air at 0 deg. C. varied from 2 to 5 mm. Penetration increases slowly with time, decreases with rising temperature, and is also proportional to the square root of the oxygen pressure.

In lean meat, oxidation of haemoglobin to the brown pigment methaemoglobin occurs only in the surface tissues, which contain dissolved oxygen.[33] Oxidation is slow at 0 deg. C., but is completed in a layer up to 1 cm. thick in about six to eight weeks.

Methaemoglobin is formed more rapidly in low oxygen pressures, and the concentration of oxygen dissolved in the tissue decreases with increasing distance from the surface. It is therefore clear that in air the rate of oxidation in the oxygenated region increases with increasing distance from the surface, and the less oxygen is contained in the storage gas the nearer to the surface is the region where methaemoglobin is most rap-

(*Turn to page 602*)

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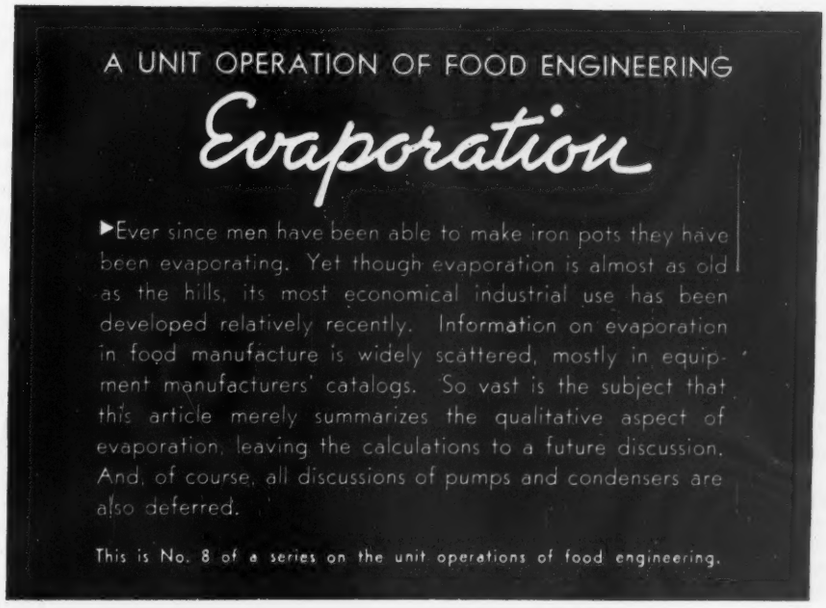
Evaporation: A Unit Operation Required for 47 Different Foods

I. *What Evaporation Does*


A UNIT OPERATION OF FOOD ENGINEERING
Evaporation
▶Ever since men have been able to make iron pots they have been evaporating. Yet though evaporation is almost as old as the hills, its most economical industrial use has been developed relatively recently. Information on evaporation in food manufacture is widely scattered, mostly in equipment manufacturers' catalogs. So vast is the subject that this article merely summarizes the qualitative aspect of evaporation, leaving the calculations to a future discussion. And, of course, all discussions of pumps and condensers are also deferred.
This is No. 8 of a series on the unit operations of food engineering.

IN the industrial production of foods, the unit operation, evaporation, always refers to the evaporation of water from solutions or suspensions of some foodstuff in water. However, this has not been always true. The one exception came during the Prohibition period, 1920-1933, when evaporation included also the evaporation of the alcohol from beer to produce "Near Beer." Except for the small percentage of alcohol in wine and beer where its function is that of a flavor, there are no other liquids in foods that are ever evaporated.

In the foregoing respect, evaporation in the food industries differs somewhat from evaporation in the chemical process industries which employ many liquids other than water. However, unless the food engineer has had evaporation experience in the sugar, salt, or corn derivatives industries, he will not find a great deal that bears specifically on food evaporation operating problems in the chemical engineering handbooks and textbooks.

Evaporating or evaporation in food engineering is the unit operation of removing by boiling a part of the water from a solution or a suspension of some food substance in water. It is done by boiling, either at atmospheric pressure or in a vacuum. The operation is not to be confused with the unit operation called "drying" although evaporation is often the first step in converting a solution into a dry substance.

In true evaporation you start with a liquid, take out part of the water, and end up with a liquid. To be sure, the liquid may have some solid particles in it, for example, such as crystals of the substance being concentrated, or the fibrous material of tomato products. In food manufacture, the operation is carried out in a vessel or device which may be anything from an open pan or kettle over an open fire up to a modern piece of industrial equipment called an evaporator. It may be the very simple open pan used by farmers for making maple syrup or sorghum syrup, or it may be a single effect evaporator in a milk condensary, or a quadruple effect evaporator in a sugar *central.*

Many of the food industries do not have enough raw material available in one place or over a period of time long enough to permit the economical use of the largest and most efficient units that are very commonly used in the larger food industries and the so-called chemical engineering process industries. Sugar and syrup manufacture are, of course, the biggest exceptions. But a large part of the food industries use the small single effect vacuum pans and the simpler forms of equipment such as jacketed kettles and cooking tanks. The latter are seldom discussed in textbooks.

An American food technologist recently reported that some plants in Switzerland are using wood fires under vacuum pans for the production of evaporated milk! And stranger yet, he reported that they were making good evaporated milk. The difficulties of using an open fire for vacuum pan operation can easily be imagined. The biggest problem of all is control.

Open fire heating is still used in some branches of food manufacture, especially in the semi-industrial production of foods on farms. Most of the maple syrup of the country is concentrated in open pans over an open fire on farms. And candy manufacturers could not get along without the gas-fired open kettles in which peanut brittle is made. Also many candy makers use an apparatus that is really a direct fired vacuum pan.

Despite the fact that many food industries are accustomed to the use of simple types of evaporating units, it is often possible to evaporate the water at a lower cost. The biggest obstacle in the way of such economy seems to be that evaporation is not well understood by many in the food industries.

It should always be remembered that the scientific principles underlying the operation and design of the best kind of evaporators are exactly the same as those which underlie the operation of the simpler forms of equipment. The food engineer could well afford to study the writings of the chemical engineer in this respect, for the chemical engineer has worked it all out for him.

Those who are making an intensive study on evaporation should have a copy of Badger and McCabe, "Elements of Chemical Engineering"; "Evaporation" by Webre and Robinson; or Badger, "Heat Transfer and Evaporation."

Evaporation is required during the production of these foods

1. Apple Butter
2. Baby Foods
3. Beef Extract
4. Brittles
5. Candy
6. Cane Syrup
7. Caramel
8. Chili Sauce
9. Cider, Concentrated
10. Coffee Extract
11. Condensed Milk
12. Corn Sugar
13. Corn Syrup
14. "Double Rich" Milk
15. Dried Buttermilk
16. Evaporated Milk
17. Fondant
18. Fountain Syrups
19. Fruit Juices
20. Gelatin
21. Glace Fruit
22. Glycerine
23. Glucose
24. Hard Candy
25. Ice Cream Mix
26. Invert Syrup
27. Jelly
28. Jam
29. Lactose
30. Maple Syrup
31. Malt Extract
32. Maltose
33. Molasses
34. Pectin
35. Powdered Milk
36. Preserves
37. Salt
38. Sorghum
39. Spanish Sauce
40. Soups
41. Sugar
42. Tomato Catsup
43. Tomato Juice
44. Tomato Paste
45. Tomato Pulp
46. Yeast Extract
47. Whey

Food derivatives that must be evaporated as by products of food manufacture

Biological Preparations
Glue
"Stick" Water

II. What an Evaporator Is

BEFORE we can go into details about evaporation it is necessary to identify an evaporator. According to the chemical engineer's concept, an evaporator is a piece of heat transfer equipment. Its purpose is to raise the temperature of a liquid to the boiling point and keep it there. As the liquid boils away evaporation takes place.

According to this definition, a steam boiler is an evaporator. So it is. And also according to this definition an evaporator can be a boiler, at least it can function as one. This last idea is very important to keep in mind, for it is by using the evaporator as a steam generator that we can develop remarkable economies in evaporation.

When it comes to discussing the manner of heating the evaporator, the food engineer must take in a little more territory than the chemical engineer. In Badger and McCabe's textbook, "Elements of Chemical Engineering," evaporation is regarded as the transfer of heat from steam to boiling liquids. But in food engineering we must also include direct fired evaporation, not only in semi-industrial work such as maple syrup and sorghum manufacture, but also in industrial production of brittles and hard candy.

However, with the exception of the high-temperature evaporation needed in candy manufacture, we must admit that all other evaporating jobs in food manufacturing could be done better with steam than with direct firing.

When the pressure of the atmosphere gives a 30-in. barometer reading, pure water will boil at 212 deg. F. If the food from which water is to be evaporated can be boiled at this temperature without deterioration, the evaporator can be open or atmospheric evaporator such as a kettle, tank, or open pan. If the food is heat-sensitive and can be safely boiled only at temperatures considerably below 212 deg. F., then it must be done in a vacuum evaporator. The reason is that, under reduced pressures, i.e., pressures, below atmospheric, water will boil at lower temperatures. The limit is a vacuum so high —29.74 in. of mercury—that water boils at 32 deg. F. And, of course, it would freeze up solid at that temperature, which would stop the boiling. (See the abbreviated steam table on p. 580 for other boiling point-pressure relationships.)

The practical limit for vacuum evaporation is about a 26-in. vacuum. To operate at higher vacuums — between 26 and 30 in.—usually costs more in food manufacture than it is worth except, perhaps, in pure vitamin manufacture.

Nearly all evaporators fall into two general classes: open or atmospheric evaporators and vacuum evaporators. Open evaporators include: direct fired pans, steam heated pans, direct fired kettles, steam jacketed kettles, tanks with cooking coils. Vacuum evaporators include vacuum kettles, vacuum pans, column evaporators and evaporating equipment that has no other name than vacuum evaporator for it is not exactly a pan, nor a kettle, nor yet a column evaporator.

Another class of evaporators, not often found in the food industries, is the pressure evaporator. It is oftenest used for evaporating waste material that has no food value. Its greatest use is for producing steam at a pressure high enough for other heating services such as stills or dryers.

Since all vacuum evaporation is of necessity done in some kind of a closed vessel to keep the air out, the vapor arising is confined and can be used if desired, or it can be wasted. It should be remembered than an evaporator is also a boiler, even when it operates under a vacuum. The vapor which boils off can be used to heat another evaporator, or it can be bled off to be used in some other heating operation if the vapor-temperature is high enough. Ultimately, however, it must be condensed somewhere in order to maintain the vacuum.

If the vapor arising from evaporating under a partial vacuum is condensed at once and put to any other use the evaporator is said to be a single effect evaporator. However, this vapor can be led into the heating tubes of another evaporator operating under a still higher vacuum. In this way it does double duty and the evaporator is said to be a double effect evaporator. The vapor arising from the second effect can be led into a third evaporator operating under a vacuum that is still higher than the second effect, and so on.

In most foods, two effects are about the limit. In the case of sugar manufacture, however, quadruple effects are commonly employed because the raw sugar can stand the high temperatures necessary in the first effect. (As a matter of academic interest it is reported that the highest number of ef-

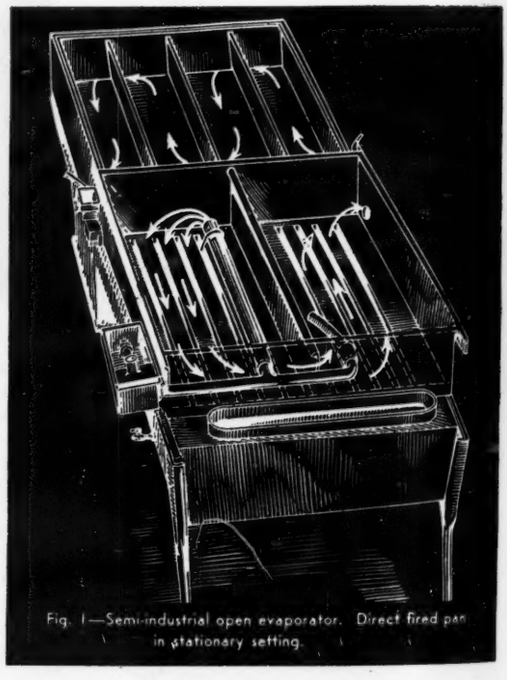


Fig. 1—Semi-industrial open evaporator. Direct fired pan in stationary setting.

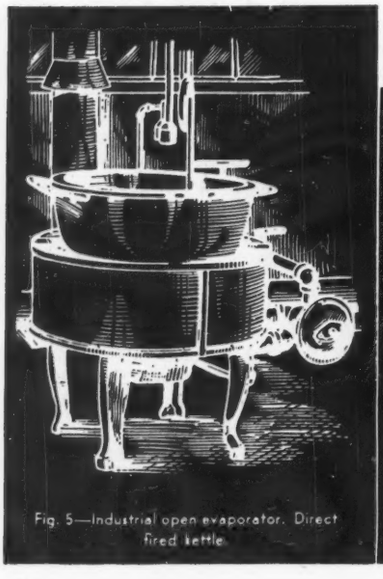


Fig. 5—Industrial open evaporator. Direct fired kettle.

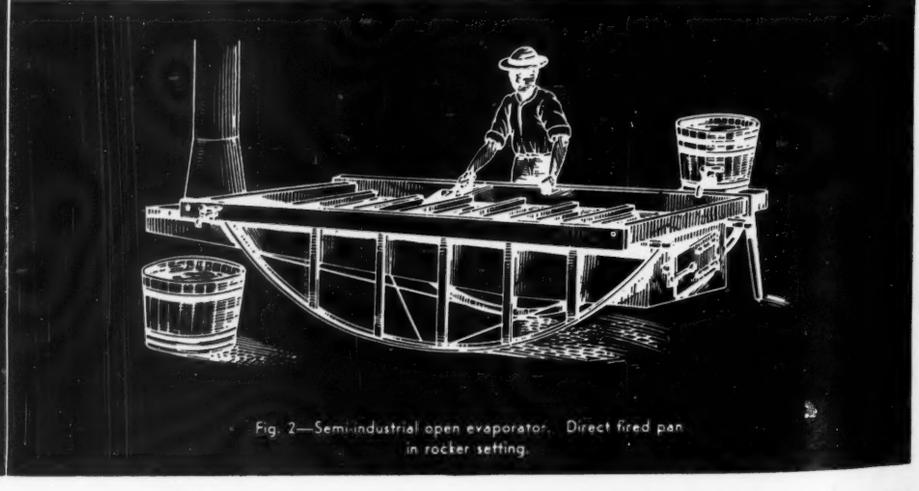


Fig. 2—Semi-industrial open evaporator. Direct fired pan in rocker setting.

fects ever put into practical operation is eleven, but this is impossible for foods.)

Why are two effects the usual limit for foods? Simply because heat behaves much like a liquid. It flows down hill. Heat flows from the hotter place to the colder. The greater the difference in temperature the greater the speed of flow. The coldest place in the evaporator system will be the condenser. This may be anywhere from 50 deg. F. to 100 deg. F., depending on the temperature and amount of condenser water available. Call it 70 deg. F. in this case. On the other hand, the hottest place in the system will be the heating surface of the first effect. What ever temperature will be permissible here will be determined by the food itself, and many foods are heat sensitive. Suppose the food is milk. The highest temperature permissible in the first effect will be about 140 deg. F. Hence the heat must flow "down hill" from 140 deg. F. to perhaps 70 deg. F. This over-all temperature drop of 70 deg. is scarcely more than enough to operate two effects properly. But there is not enough of a drop to operate three effects at the correct rate of evaporation. The operation becomes too slow. Time is a factor with respect to the damage that may be done by temperature to the food, just as much as it is a factor in the economy of the operation.

Fig. 3—Semi-industrial open evaporator. Steam heated barrel evaporator.

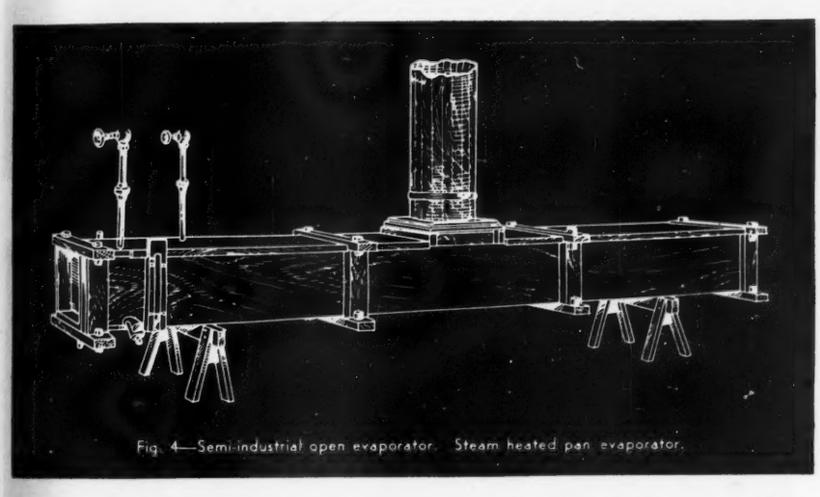


Fig. 4—Semi-industrial open evaporator. Steam heated pan evaporator.

In simple theory 1 lb. of steam introduced into the heater of the first effect should evaporate 1 lb. of water into steam; and theoretically this 1 lb. of steam should evaporate another 1 lb. of water in the next effect. (The rule-of-thumb method of figuring is that for every pound of steam used there will be evaporated as many pounds of water as there are effects. Actually this is not quite true. For reasons that lack of space does not permit discussing, it requires slightly more initial steam. In a triple effect evaporator, 0.4 lb. of steam evaporates about 1 lb. of water, instead of 1.2 lb. predicted by the rule-of-thumb.)

This is where the real evaporating economy comes in. The steam can be made to do approximately double or triple duty. It reduces the cost of heat for evaporating a pound of water. But it does not increase the capacity, i.e., the ability of the evaporator to do the job at a specified rate per hour.

To illustrate: If an evaporating job calls for evaporating 10,000 lb. of water per hour, you cannot hook up a pair of smaller capacity evaporators as a double effect unit and get the job done, even if each of them, working alone as a single effect evaporator, will do 5,000 lb. per hour. You cannot have your cake and eat it. By hooking up two fives as a double effect evaporator, you merely evaporate 5,000 lb. per hour at about half the steam cost.

Perhaps it is a little hard to understand. Think of it in this way. The principle controlling factors are the area of the heating surface and the temperature drop across the evaporating system. You have two evaporators, just alike in construction. Heating surfaces are exactly equal. Suppose you have a possible total temperature drop of 70 deg. F. If you utilize it all in one pan the rate of evaporation will be 5,000 lb. per hour. If you divide it between two pans each of them will get a little less than half the temperature drop. So, as a matter of fact, the double effect evaporator will not perform quite so rapidly as the single effect of the same size, though its economy will be much greater.

Recompression Evaporators

Another economy in evaporator operation is the recompression of the vapor arising from the boiling liquid. The compressed vapor is then fed back into the heater of the *same* evaporator, and is used to heat the liquid being evaporated. In a sense it is something like a regenerative circuit on a radio. The recompression is done by a jet of steam at 50 lb. or higher pressure in a special type of ejector. The heat from the live steam is added to the heat in the vapor and the combined steam is at a temperature (and pressure) high enough to operate the evaporator efficiently. Roughly half of the vapor is reused and half is condensed.

A single effect evaporator, operating with recompression, will often be more economical of heat than a double effect evaporator. One equipment designer says that it is possible to design a recompression evaporator which will give a triple effect economy.

A further advantage of recompression is that the heating tubes of the evaporator will do about one-half of the condensing. This makes it possible to use a smaller condenser and, of course, it requires smaller amounts of condenser water than when operating without recompression.

By this system with special evaporators it is possible to evaporate at 90 deg. F. boiling temperature if condenser water is available at 70 deg. F.

Many people make the mistake of confusing economy with capacity. For this reason some pretty careful calculations are required when getting up an operating cost-estimate where evaporation is an important unit operation in a food manufacturing plant. Sometimes you have to decide between running a small evaporator 24 hours a day to get the steam economy, or running a bigger evaporator eight hours a day to get the labor economy. (See also p. 577.)

Vacuum Evaporators

The essential features for a vacuum evaporator, as listed by Badger and McCabe, consist of:

1. A compartment for the boiling liquid.
2. A compartment for the condensing steam.
3. A heating surface through which heat flows from the steam to the boiling liquid.
4. An outlet for the vapors produced by the boiling liquid.
5. An inlet for the steam.

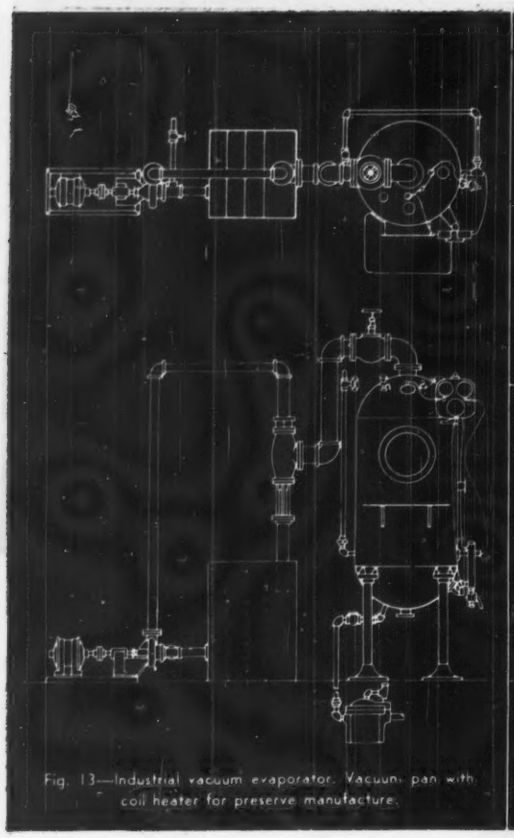


Fig. 13—Industrial vacuum evaporator. Vacuum pan with coil heater for preserve manufacture.

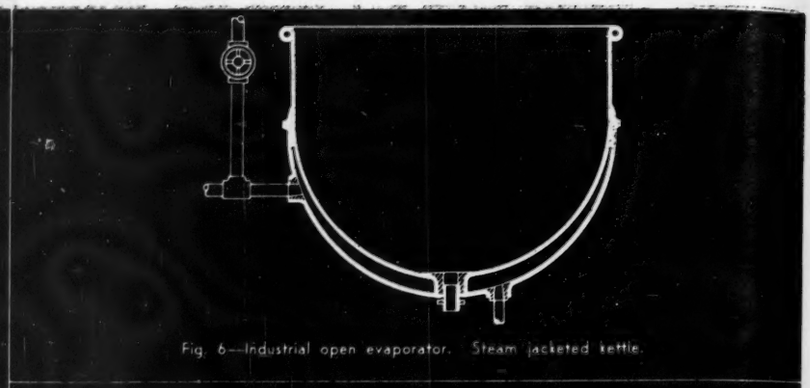


Fig. 6—Industrial open evaporator. Steam jacketed kettle.

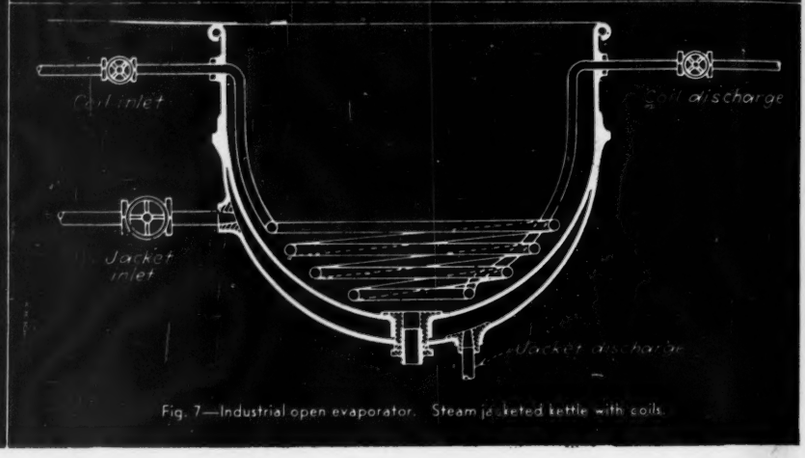


Fig. 7—Industrial open evaporator. Steam jacketed kettle with coils.

6. Provision for withdrawing condensate from the steam.
7. Means for withdrawing from the steam compartment the gaseous impurities that are not condensed.
8. Means for charging and discharging the solution to be evaporated.
9. Suitable controls and instruments for checking the operation of the evaporator.

Open Type Evaporators

In an open type steam heated evaporator there are fewer features, viz:

1. A compartment for the boiling liquid.
2. A compartment for the condensing steam.
3. A heating surface through which heat flows from the steam (or fire) to the boiling liquid.
4. An inlet for the steam.
5. Provision for withdrawing condensate from the steam.
6. Means for charging and discharging the solution to be evaporated.
7. Suitable controls and instruments for checking the operation of the evaporator (sometimes).

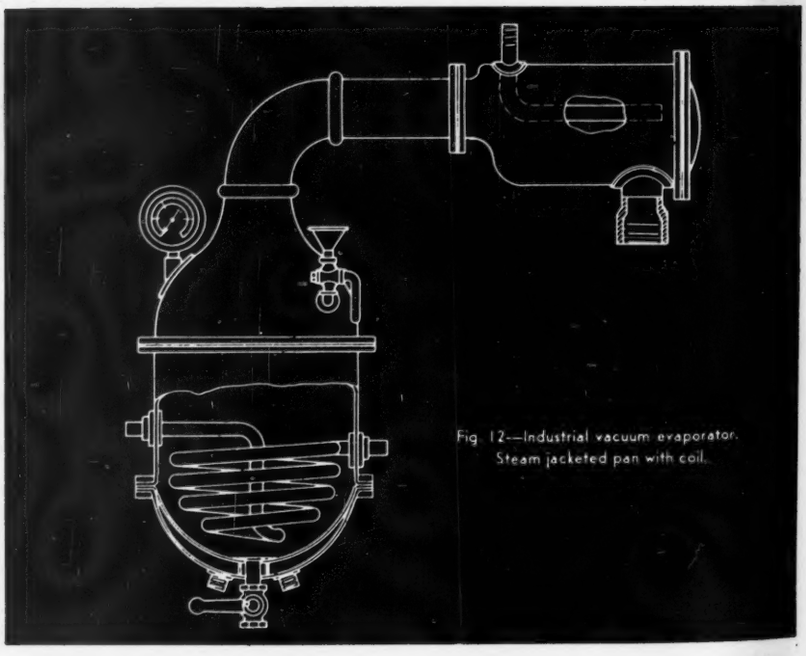


Fig. 12—Industrial vacuum evaporator. Steam jacketed pan with coil.

Open Type Evaporators

Some of the open type evaporators appear to be rather primitive, especially those that are to be regarded as semi-industrial and best suited for use on the farm.

Diagrams of representative types of open evaporators are shown as follows:

Semi-Industrial Types

Fig. 1. Direct fired pan in stationary setting. Geo. H. Soule Co.

Fig. 2. Direct fired pan in rocker setting. C. S. Bell Co.

Fig. 3. Steam heated barrel evaporator. Dunning & Boschert Press Co.

Fig. 4. Steam heated pan evaporator. Hydraulic Press Manufacturing Co.

Industrial Types

Fig. 5. Direct fired kettle.

Fig. 6. Steam jacketed kettle.

Fig. 7. Steam jacketed kettle with coils.

Fig. 8. Steam jacketed kettle, cast iron. Sowers Manufacturing Co.

Fig. 9. Steam coils in tank. F. H. Langsenkamp Co.

Industrial Vacuum Evaporators

Fig. 10. Steam jacketed vacuum kettle. Brighton Copper Works.

Fig. 11. Direct fired vacuum kettle. Vacuum Candy Machinery Co.

Fig. 12. Steam jacketed pan with coil. Brighton Copper Works.

Fig. 13. Vacuum pan with coil heater for preserve manufacture. The Pfaudler Co.

Fig. 14. Vacuum pan with individual coil heater and internal condenser. Arthur Harris Co.

Fig. 15. Agitator vacuum pan. F. J. Stokes Machine Co.

Fig. 16. "Continuous sugar cooker." Baker Perkins Co., Inc.

Fig. 17. Single effect evaporator with calandria heater and salt extractors. Wurster & Sanger, Inc.

Fig. 18. Quadruple effect vertical tube evaporator with finishing pan. Buffalo Foundry & Machine Co.

Fig. 19 Inclined tube evaporator. Struthers-Wells Co.

Fig. 20. Vacuum pan for continuous removal of crystals. Manistee Iron Works Co.

Fig. 21. Horizontal tube evaporator (condenser omitted). J. P. Devine Manufacturing Co., Inc.

Fig. 22. Falling film evaporator. Zaremba Co.

Fig. 23. Double effect climbing film evaporator. Wurster & Sanger, Inc.

Fig. 24. Single pass evaporator. Buffalo Foundry & Machine Co.

Fig. 25 Vacuum evaporator with removable heater. Oakland Copper & Brass Works.

Fig. 26. Evaporator for indirect heating of beer still. Acme Coppersmithing & Machine Co.

Fig. 27. Forced circulation evaporator. Swenson Evaporator Co.

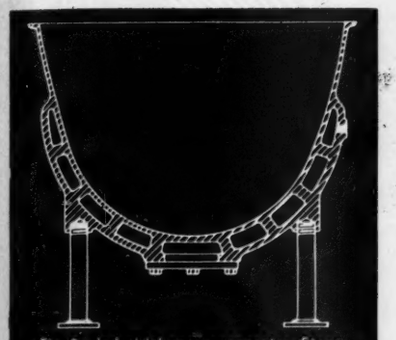


Fig. 8—Industrial open evaporator. Steam jacketed kettle, cast iron.

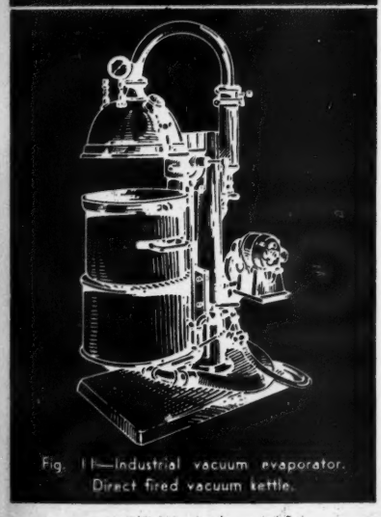


Fig. 11—Industrial vacuum evaporator. Direct fired vacuum kettle.

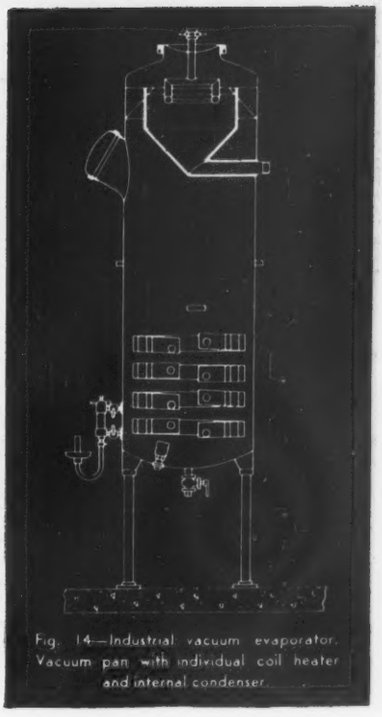


Fig. 14—Industrial vacuum evaporator. Vacuum pan with individual coil heater and internal condenser.

III. How to Select the Right Type of Evaporator

When you decide on what method of evaporating, or type of evaporator to use, the basis of your decision must be the food itself. Many foods are heat sensitive, which means that the food is adversely affected above a certain temperature.

Evaporation of foods is, therefore, a specialized part of the whole field of evaporation. Food materials can exist in only a very limited temperature range without being considerably changed, and thereby losing their marketability. Some foods are injured by freezing. Some are injured about 145 deg. F. Others can take it up to 180 deg. F. Still others can withstand 212 deg. F. and a very few can stand processing at as high as 250 deg. F. for limited periods of time. In all these temperature relationships, the time factor is very important, even when freezing a food. Generally speaking, the shorter the time the more severe can be the heat treatment without doing serious harm to the food.

Changes To Be Avoided

The changes that may be brought about by heat are many. They include alteration

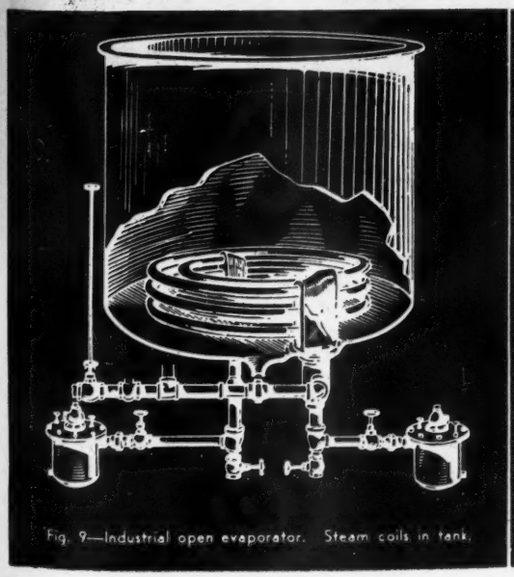


Fig. 9—Industrial open evaporator. Steam coils in tank.

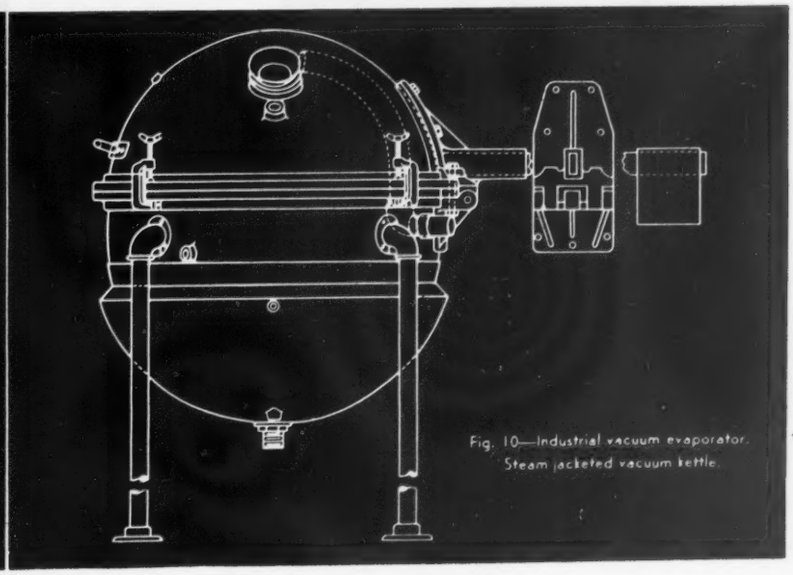


Fig. 10—Industrial vacuum evaporator. Steam jacketed vacuum kettle.

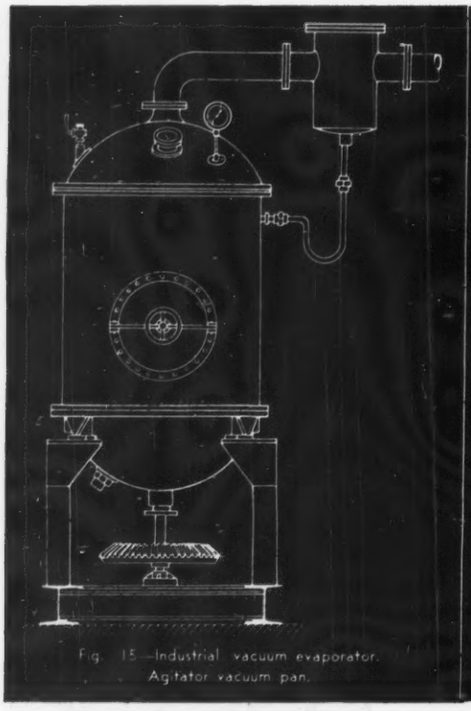


Fig. 15—Industrial vacuum evaporator. Agitator vacuum pan.

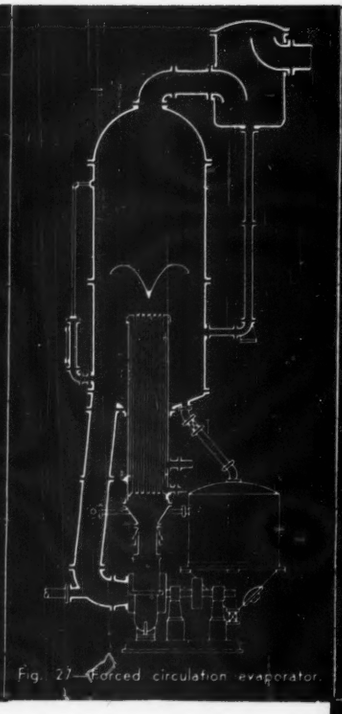


Fig. 27—Forced circulation evaporator.

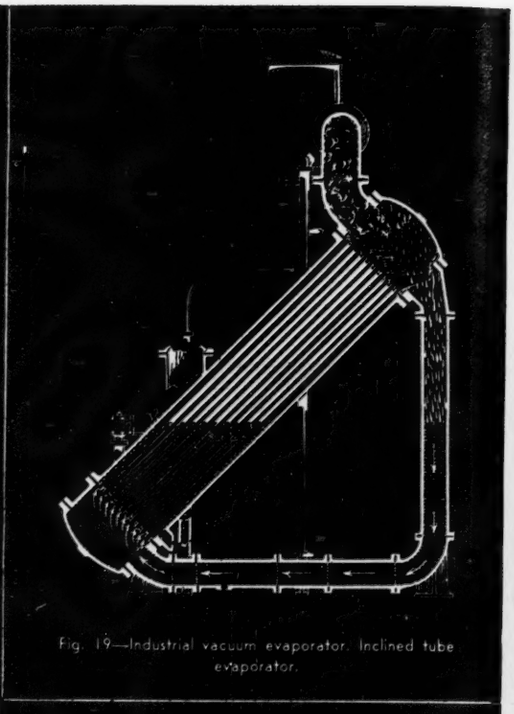


Fig. 19—Industrial vacuum evaporator. Inclined tube evaporator.

of the character of emulsions, coagulation of protein material, destruction of enzymes, precipitation of mineral salts, scorching and downright burning, destruction of flavor, volatilization of flavor, loss of color, softening of texture, hydrolysis of such things as sugars, gelatin and esters. Any one of these difficulties is a very serious matter, and must influence the food engineer in his choice of method of evaporation.

The factors arising from the food itself to be considered are:

1. Heat sensitivity.
2. The time factor.
3. Viscosity or sluggishness of flow.
4. Foaming tendency.
5. Mechanical effects on food solids under vacuum. (Important in making whole fruit preserves.)
6. Final temperature to be reached. (Important in candy manufacture.)

Also there are other factors which must be considered. These are matters that pertain to the plant and its services:

1. Availability of surplus low pressure steam.
2. Need for surplus low pressure steam for other operations.
3. Availability of plenty of condenser water.
4. Amount of money available for the initial investment.

After you have decided on what type of evaporator, i.e., vacuum or atmospheric, and if the former, at what temperatures you must operate, you are now in a position to decide on the further specifications of the equipment, and to figure on what make of equipment of the type specified will do the job best.

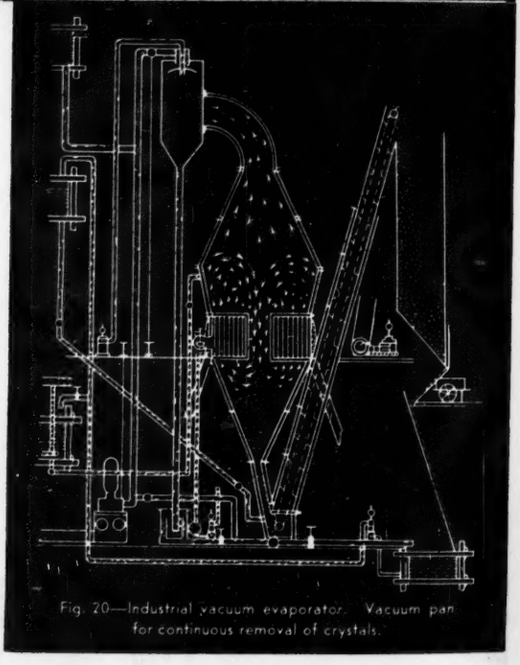


Fig. 20—Industrial vacuum evaporator. Vacuum pan for continuous removal of crystals.

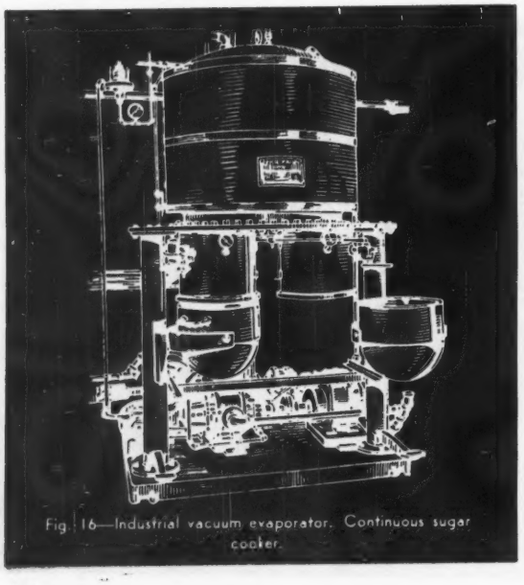


Fig. 16—Industrial vacuum evaporator. Continuous sugar cooker.

Ordinarily you should know more about the food you are manufacturing than the equipment maker. You should be able to tell him what is the top temperature that your food can stand, and how long it can stand it. Sometimes, however, he knows much more about it than you, the food manufacturer. In which case you take his advice. However, such specialists are not very plentiful. As a rule the equipment maker is a fabricator who knows all about steam, metals and how to build the equipment. And as a rule, he will want you to tell him how much you want evaporated per hour, how fast you want the evaporation to proceed, how high is the top limit of temperature, how long can the product under evaporation be kept hot without noticeable deterioration, whether it foams badly or not, how much surplus steam you have available and its pressure, how much condenser water you have available and its temperature. Then with all this data he is ready to begin to figure on how to solve your problem.

Among the foods that are particularly

sensitive to heat, diastatic malt extract or other enzyme preparations stand at about the top of the list with milk as a close second. Others are fruit juices, certain candies, gelatin, beef and yeast extracts, whole fruit preserves, fountain syrups, and many kinds of sugars. Most of these require vacuum evaporation in order to keep the boiling point down to a figure where no harm will be done.

There are others which can stand a temperature of about 212 deg. F. or in a few cases higher, for a short time without serious injury, such as: cane syrup, chili sauce, catsup and pulp, jams, jellies, glycerine, maple syrup, sorghum, soups, dried buttermilk and salt. But in many such foods the use of vacuum evaporation is better because of its economy or the improved quality of the product. The economy feature is especially true of salt, dried buttermilk and some soups.

And then there are a few foods, such as hard candy and peanut brittle where the temperatures used during evaporation are so high that a steam-jacket kettle could not be used economically. The pressure would be so high that the kettle would have to be enormously heavy and expensive. So in this case the product is evaporated over an open fire, usually a gas flame, and sometimes it is supplemented by vacuum.

From the three previous paragraphs it will be seen that low-temperature evaporation is a necessity for some foods, optional with others, and an impossibility for a few more. Where it is optional—when either vacuum or atmospheric evaporation can be used—the choice is based on the cost of performing the unit operation at the place where the job is to be done.

A common fallacy regarding evaporation under a vacuum is that, because the boiling point is lower under vacuum, less heat should be needed to evaporate a pound of water. As a matter of fact, just the opposite is true. If anyone will refer to a "Steam Table," he will readily see that more B.t.u. per pound of water evaporated are required at a 20-in. vacuum than at atmospheric pressure. Also he will see that as pressures (not vacuum) increase above atmospheric there are successively less B.t.u. required to convert 1 lb. of water into steam.

The figures in Table I, taken from Table of Properties of Saturated Steam, Kent's *Mechanical Engineers Handbook*, show the theoretical amount of heat required to convert 1 lb. of water into steam at various pressures. Nearly all food evaporation must be carried on between the temperatures corresponding to a 26-in. vacuum and 10-lb. gage pressure per square inch. These temperatures lie between 125 deg. F. and 240 deg. F. with the noteable exception of the case of brittles where much higher temperatures are needed.

Many products are damaged at temperatures above, say 120-140 deg. F. The higher the temperature, the faster is the damage. Gelatin is such a food. Lactose is another.

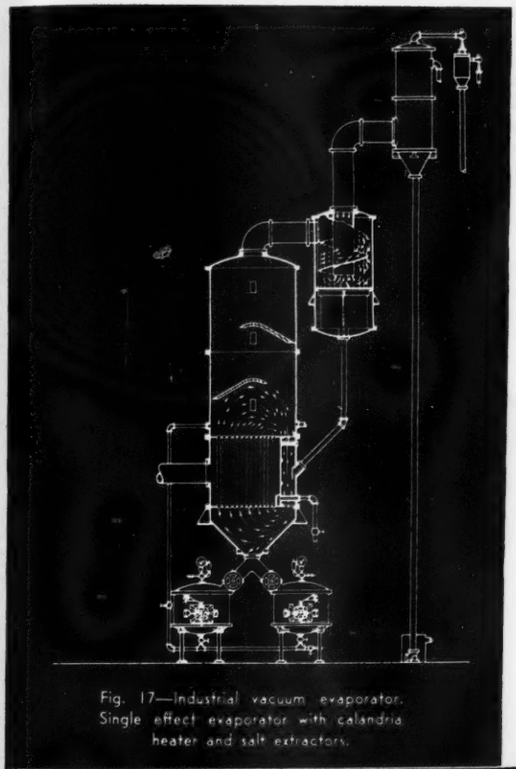


Fig. 17—Industrial vacuum evaporator. Single effect evaporator with calandria heater and salt extractors.

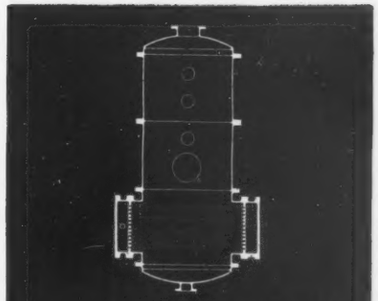


Fig. 21—Industrial vacuum evaporator. Horizontal tube evaporator (condenser omitted).

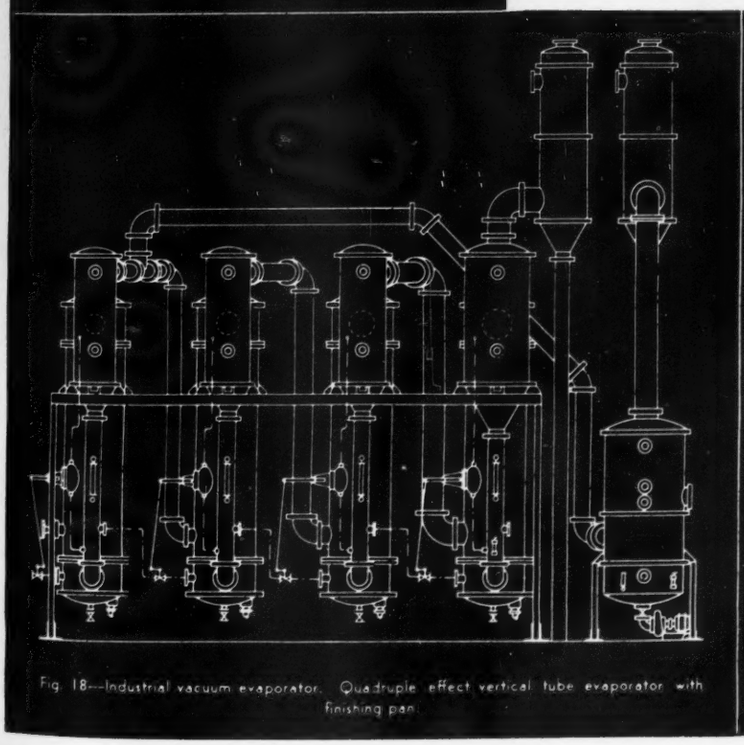


Fig. 18—Industrial vacuum evaporator. Quadruple effect vertical tube evaporator with finishing pan.

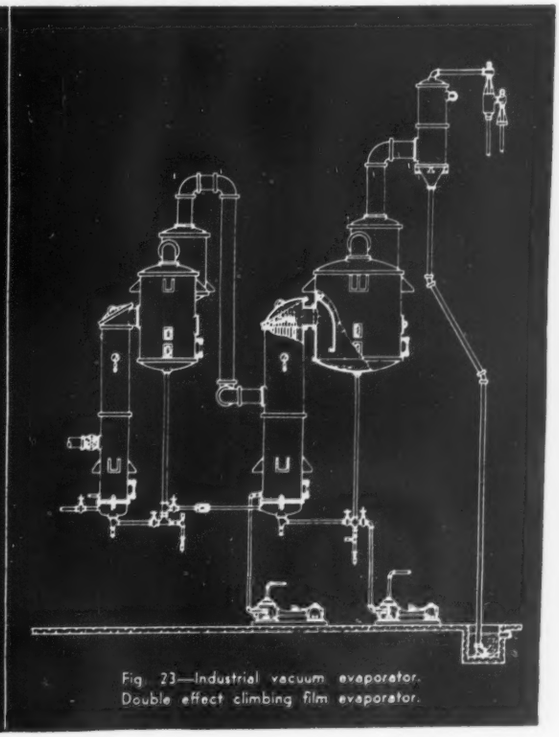


Fig. 23—Industrial vacuum evaporator. Double effect climbing film evaporator.

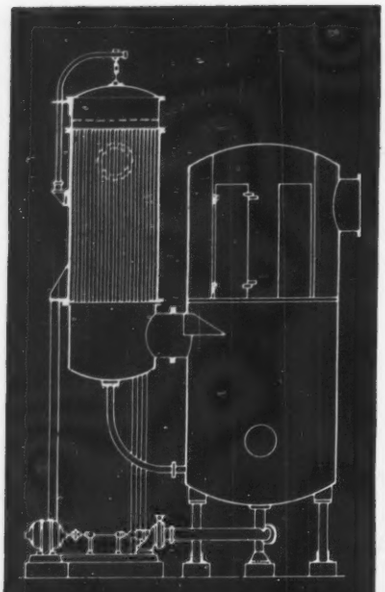


Fig. 22—Industrial vacuum evaporator. Falling film evaporator.

Table I—*Abridged Table of Properties of Saturated Steam*

Vacuum, In. of Mercury	Absolute Pressure Lb. per Sq. In.	Temperature Deg. F.	Latent Heat of Evaporation Btu. per Lb.	Volume, Cu.Ft. in 1 Lb. Steam
29.74	0.0886	32	1073.4	3294
29.40	0.2562	60	1057.8	1208
28.50	0.696	90	1041.2	469.3
25.85	2	126.15	1021.0	173.5
21.78	4	153.01	1005.7	90.5
17.70	6	170.06	995.8	61.89
13.63	8	182.86	988.2	47.27
9.56	10	193.22	982.0	38.38
5.49	12	201.96	976.6	32.36
1.42	14	209.55	971.9	28.02
0	14.70	212	970.4	26.79
Lb. Gage Pressure				
2.3	17	219	965.6	23.38
5.3	20	228	960.00	20.08
10.3	25	240	952	16.30

Pectin and diastatic malt extract and milk are also in this group. In concentrating a solution of any of these unusually heat-sensitive foods the choice of the type of evaporator is extremely important. That the job should be done under a high vacuum goes without saying. But the time element is also very important.

For these and similar jobs an evaporator should be chosen that will not only operate at low temperature, but will do the work quickly. Fortunately there are now on the market several kinds of equipment designed to do this very job. Several equipment makers put out a single effect evaporator in which the design is such that one passage through the unit will remove the required amount of water. Another type of evaporator pumps the liquid into the top and lets it flow *downward* through the heating tubes, thereby assisting the movement by gravity. It is known as the falling film type. This unit concentrates the liquid in a few seconds.

In general, the trend of design today is toward evaporators which have only a very small amount of liquid in them at any one time. This is particularly true where the equipment maker is catering to the needs of the manufacturer of extremely heat sensitive foods. Cutting down the evaporating time has sometimes increased yields of valuable products by several per cent through avoiding their destruction. In one case the increased yield paid for a new evaporator in less than two years.

Where products become thick during concentration and are very vicious it is necessary to use special types of evaporators. Forced circulation by means of a centrifugal pump is one way. The pump is built into the equipment as an integral part of the unit (See Fig. 27).

In other cases it may be necessary to use an agitator and scraper inside the evaporator. In extreme cases it may be necessary to remove the water in a two-stage operation, first in a vacuum pan and last in a shallow open kettle equipped with stirrers but heated with warm water at about 150 deg. This method is often used for the production of meat extract and its final stage is a sort of drying rather than true evaporation. At any rate, it does not boil.

When crystals form in the liquid being concentrated, it is necessary to provide a place for them to go. In such work a crystallizing evaporator is used. (See Fig. 17 and 20.) Crystals can be removed either by the batch method or continuously.

There is also the choice between continuous evaporation and batch evaporation. In the first method, the flow of material is uninterrupted and can be regulated so that the output is at the correct concentration.

In making preserves, where the effort is usually to keep the fruit as nearly whole as possible, the use of a vacuum evaporator is a great help. It happens that in this case the effect of vacuum is two fold. It reduces the boiling point of the syrup and so avoids softening the fruit. Also it serves to suck the air out of the pores of the fruit and when the vacuum is broken the syrup goes into these same pores. A couple of cycles of this treatment works wonders.

In conclusion it must be emphasized that the surface of the knowledge of evaporation has hardly been scratched in this article. Nothing has been said about calculations, almost nothing about liquid velocities. No mention has been made about materials of construction. No mention has been made of cleaning and sanitation. The use of low pressure steam, bled off from one of the effects, for other purposes has only been hinted at. Likewise all operating difficulties have been omitted. A huge book could be written on the whole subject of evaporation for which the foregoing eight pages would only serve as an introduction.

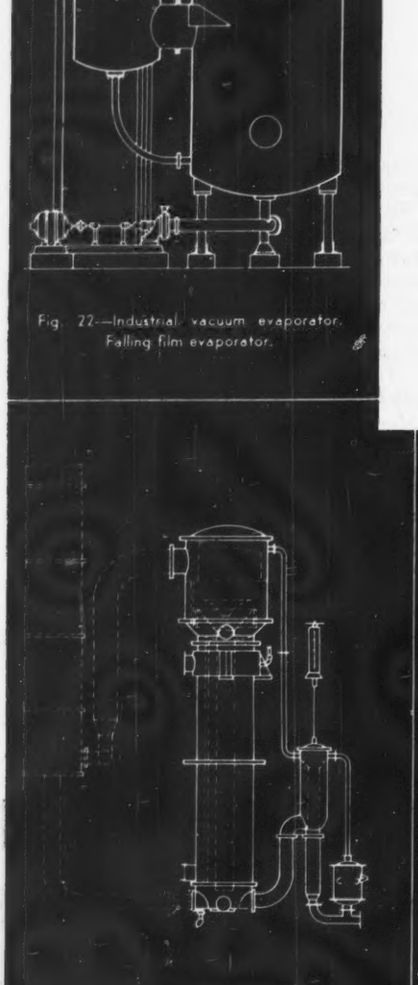


Fig. 26—Evaporator for indirect heating of beer still.

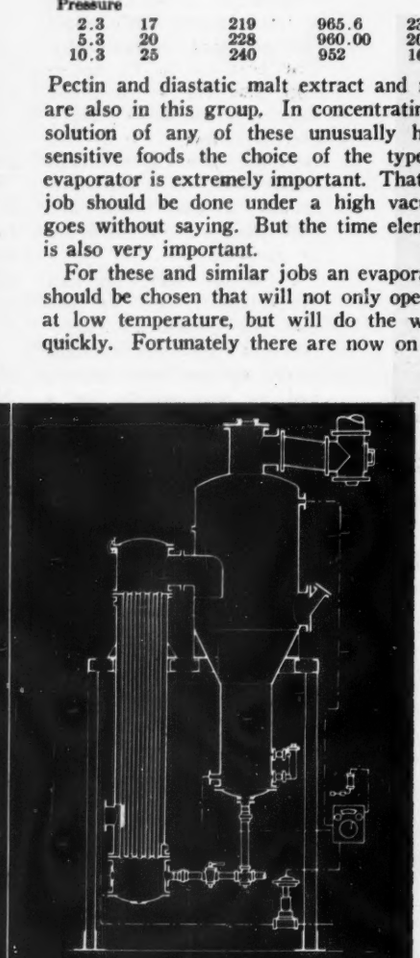


Fig. 24—Industrial vacuum evaporator. Single pass evaporator.

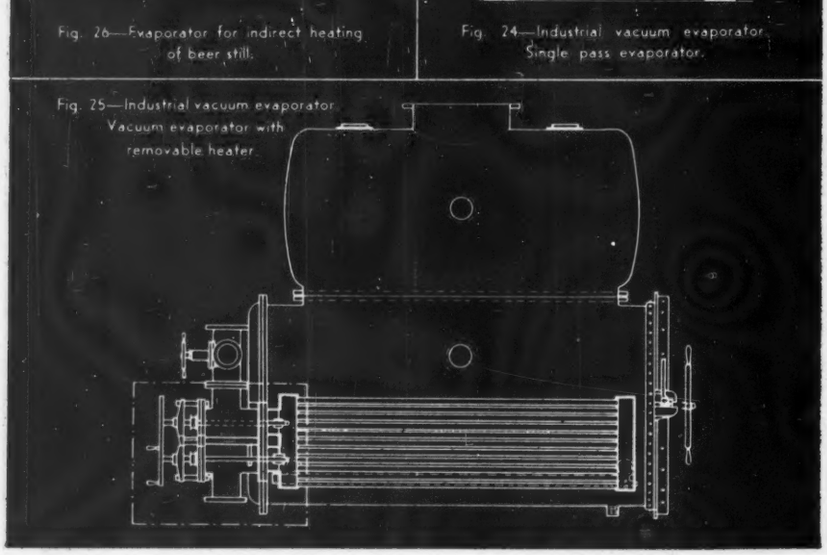


Fig. 25—Industrial vacuum evaporator. Vacuum evaporator with removable heater.

EVERYDAY OPERATING PROBLEMS OF FOREMEN · SUPERINTENDENTS · PRODUCTION MANAGERS

Experience or Obstinacy?

WHO is the biggest obstacle to lowered costs? It isn't always the chap in charge who balks at improvements. There are times when it is the workmen or operators who are dead set against any change.

They will readily agree to the principle that cutting down the cost of production is a good thing. Yet when you try to show them how a change will do the trick, they lay back their ears and say, "No go." They balk without even giving the new idea a trial. Often the bosses are as bad.

Balking Gets One Nowhere

Such behavior doesn't help the individual a bit. Neither does it help the company. One of the surest ways to get one's self out on a limb is to oppose all improvement. The man who refuses to do a thing in a different way, and has no other basis of refusal than simply because it is new, is just as much of a pest around the plant as the chap who is always experimenting without telling his superiors what he is up to.

When a chap has learned a trade or how to run some piece of equipment from an old timer, he is very likely to acquire the old timer's viewpoint as well. And if he learns the "*how* to do it" without learning the "*why* of doing it," he is only half-trained. Then, when some-one comes along a few years later with a better way of doing the same job, he may think the old way is the only way. Everything else must be a flop.

Now we do not minimize experience. It's a grand teacher. We have had quite a bit of it ourselves. But experience means a whole lot more than sticking blindly to tradition. If experience teaches a man anything it should teach him the importance of an open mind.

Fooling The Operators

These thoughts came to us while we were working on the article on evaporation in this issue. For the most part evaporators and cookers can work on low pressure steam—low pressure being around 5 or 10 lb. per square inch—just as well as on higher pressure. There is a certain plant in these United States where there are three of these obstinate fellows who have been fooled about steam pressures for several years. The company had to fool them to get an improvement into their department.

Bigger Pipes For Low-Pressure Steam

For years they had steam at 60 lb. gage pressure in their department. The engineering department figured that the department could be run a whole lot cheaper on exhaust steam at 10 lb. pressure than on live steam at 60 lb. The engineering department knew its stuff. It knew that with lower pressure you need bigger pipes. It knew that it was heat units, plain old B.t.u., and not pounds on a pressure gage that operated the cookers.

Yet these three operators, aided and abetted by their strawboss, balked at the idea. They knew it couldn't be done.

The general superintendent told us they threatened to walk out on the job if any body so much as changed the steam pressure. But he was foxy. He didn't fight.

One Sunday the pipe-fitter gang came in, put in an 8-in. steam header, hooked up the old cookers to the new line, put on a new pressure gage and went home. On Monday the operating gang were told the old pipes had been replaced because they had corroded, and that some clumsy idiot had accidentally smashed the old pressure gage. Why the much bigger pipe? Well, it was all they had on hand.

The Trick Pressure Gage

Everything worked to perfection and it still works that way after nearly five years. Of course, by now you have guessed it. The new pipe line carried only exhaust steam at 10-lb. pressure. But the new pressure gage read 60 lb. So everybody is happy.

So much for experience.

Thinking Big

A FEW weeks ago we went through a big plant that has been completely revamped. The thing about it that will appeal to any experienced production man is not its size, nor even its efficiency. What will strike him favorably is the kind of thinking that was used when they rebuilt the plant.

If you have ever had any experience with the troubles of getting huge, heavy equipment up to an upper floor you will see that the chap who bossed the rebuilding job was thinking big. He didn't pussy-foot on a big job. He was not hide-bound by tradition. If he had been, he would have wasted a lot of money.

This plant has many big tanks on its third and fourth floors. In the old days he would have knocked a big hole in the wall and then hoisted these 12 to 15-ton tanks up outside the building. Of course he would have had to build cribbing, all the way up from the ground, to hold the tanks up while sliding them into the building. And then he would have had to brick up the hole in the wall.

On this job all such waste was avoided. The first move was to put in a 15-ton elevator. Naturally a big elevator costs money, but in this place the elevator practically paid for itself during the rebuilding. One man could move a 15-ton tank up to the top floor in a minute or two. If the job had been done in the old way, each tank would have been an all day job for a big gang.

The plant now has an elevator that will do the same job any time. Repairs, replacements or enlargements can be done at a small cost.

It pays to think big, even though the board of directors has to vote on spending the money. Usually they will spend it if they can be shown that they can make money by doing it.

Thinking small never gets a fellow anywhere. However, thinking big does not mean going haywire on wild ideas. It means planning how to do a job in a way that is equal to the problem to be solved. It involves the kind of planning that marks the successful man.

ANSWERS TO PLANT QUESTIONS

This Month's Question

What practice do you follow in the care of your thermometers, temperature recorders, and similar precision instruments to avoid breakage, and to assure cleanliness and accuracy?

Uses Protected Thermometers

IN our cold rooms we use ordinary mercury thermometers which are fastened to the walls of the rooms where they are not likely to be struck by trucks coming in or going out.

For our cooking operations, portable thermometers of the hand type are used. They are of the armored type as used for bakery doughs, confectionery, and similar food products. Wall cases are provided for their safekeeping when not in use.

Accuracy of both types of thermometers used by us is checked by comparison with laboratory thermometers as standards.

Construction of the cooking thermometers we use prevents the possibility of accumulation of food materials which promote bacterial development. They are kept clean by washing with soap and water.—L. BISNO, *Pie Bakeries, Inc., Newark, N. J.*

Has Special Instrument Man

ALL recording instruments, including thermometers, temperature records, flow meters and electrical equipment are serviced by one experienced man. This service includes cleaning, checking, changing charts, repairing instruments and repairing clock mechanisms.

We have found that it requires all the time of one man to give the proper care to the instruments and measuring devices of this plant. His schedule is arranged so that he changes each chart when it has covered a 24-hour day. For instance, a chart on a particular instrument may be changed at 9:25 a.m. and within a slight variation, this chart is changed the following day at the same time, providing a 24-hour record.

The instrument man is thoroughly familiar with all repairs and is capable of completely overhauling any of the clock mechanisms. In addition he is thoroughly familiar with all of the plant operations and is particularly vigilant in keeping all recorders functioning properly. In some cases spare equipment is provided in order that the instrument man may remove the regular equipment completely from service for cleaning and overhauling

Completed charts from the various instruments are delivered to the departmental heads most interested in the information shown on the charts. If any unusual occurrences are indicated by the chart record, the cause can be immediately investigated and corrective measures taken. In this plant, distribution is made to five different departments.

The responsibility for maintaining an adequate supply of charts rests with the instrument man. In this connection efforts are made to standardize on instruments insofar as possible so that the same chart may serve as may recorders as possible. This makes it somewhat easier for the instrument man to keep account of the charts on hand. No particular arrangement has been made for reordering the charts as this responsibility rests with the instrument man and the stores keeper.

In addition to caring for the recording equipment our instrument man also maintains time clocks, scales and miscellaneous metering apparatus. From time to time it is necessary to provide this man with additional help in order that he may make complete inspections, adjustments and repairs promptly without interfering with his other duties.

A follow-up man has been trained to look after instruments and metering equipment when the regular man is away from the plant so there is no break in the continuity of supervision of instruments. — ROBERT J. GORDON, *Walter Baker Co., Dorchester, Mass.*

Has Instrument Department

IN our plants we have several thousand instruments. The repair, calibration and maintenance of these scientific instruments is placed with a special Instrument Department, rather than have each plant assume this responsibility.

At the end of each operating season, all instruments are cleaned and stored in a special locker reserved for that purpose. Where it is not it is cleaned and wrapped in paper.

During the non-operating period, a representative from the Instrument Department visits each plant and tests all thermometers and gages. All control equipment is inspected and, as far as possible, necessary repairs are made at the plant. Any equipment needing major repairs or calibration is ordered to the main instrument shop for overhauling.

Just before each operating season, the plant is again visited and all instruments are tested under actual operating conditions.

The individual plants are not allowed at any time to make repairs or adjustments to any instrument. In case of trouble, the Instrument Department is notified. It investigates and corrects the existing trouble.

Because of the care and service given these instruments before the operating season begins, service calls are held down to a minimum. By concentrating the responsibility for the operation of all instruments in one department and prohibiting plant repairs by untrained and inexperienced men, service costs are kept down to a minimum and the life of each instrument is increased considerably. —E. H. PYLE, *California Packing Corp., San Francisco, Calif.*

Next Question

What system do you follow in doing your repair and maintenance work? Is it done in a continuous manner while plant is in operation or do you shut down periodically and do an overhauling of your equipment?

THE PLANT NOTEBOOK

FIVE DOLLARS WILL BE PAID FOR BRIEF STORIES WHICH ARE SUITABLE FOR USE IN THIS DEPARTMENT. SKETCHES OR PHOTOS SHOULD BE PROVIDED WHENEVER POSSIBLE.

Buying Coal In Summer

COAL merchants often urge their customers to buy their heating coal during the summer on the plea that prices are then lower. I will describe the experience of a coal user who adopted this policy but did not find it profitable.

The plant has two heating boilers of 500 hp. capacity each. The coal bunkers hold about 300 tons total, the annual coal consumption being about 2,500 tons. Five years ago the bunkers were filled during the summer but about a month before the heating season started it was discovered that the coal had caught fire by spontaneous combustion.

At great inconvenience the coal had to be removed from the bunkers and spread out on the boiler room floor and every other available place. It was spread about one foot thick and water was applied liberally. It remained in this position for about two weeks during which time it was watched and when fire broke out at any point more water was applied. The coal was then put back in the bunkers. The labor cost of this work was about $400 to which must be added the loss of coal burned, which was not possible to estimate.

It is true that sometimes coal can be bought cheaper in the summer. But it is also true that coal put in storage during the summer is in much greater danger of spontaneous combustion. Buying coal during the summer is justifiable only when the price advantage is appreciable or there is certainty that the coal will not get on fire.—N. T. PEF, *Chicago, Ill.*

Acid Container

HOW often have you wanted some of the "old reliable" acid to do that little soldering job; but it being so sloppy and eating up brushes faster than you could make them, you sadly turned to the paste can?

Before you start the next invention, secure an empty, large sized Odorono bottle, trim the sides of the sponge rubber brush a little so it will slip in and out easily, then put your acid in the bottle.

The cover of the bottle is leakproof, the brush lasts indefinitely, and your acid is always ready.—HARRY STINER, *Glendale, Calif.*

Uses of Flexible Shaft

TOOLS that can be operated by means of flexible shaft equipment are easily portable and are constantly being applied in new ways. The following applications are highly practical and may quite possibly suggest something of value to the aggressive foreman or plant engineer who has an eye to cutting costs by using standard machinery in new ways.

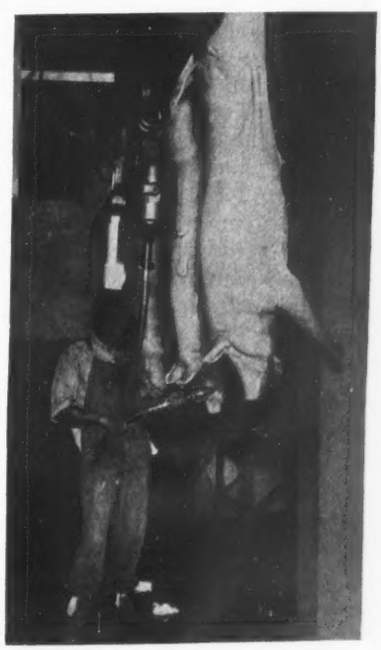
One operation is the dressing of the mill stones used for the grinding spices. It is naturally much faster than hand dressing, and the stones can be kept sharp all the time at less expense. Therefore, a finer product of more uniform texture can be obtained. There are instances on record where this method has reduced the time of hand dressing by 85 per cent, and in addition there is no danger of chipping or cracking the stones.

Perhaps two of the most interesting applications are in meat packing. One of these is shown in one of the photographs, where a ham boiler is being cleaned after the boiling process by means of a portable flexible shaft outfit provided with a wire brush. This has proved to be a very effective method of cleaning. Of course, the same outfit has many other uses about the packing plant, such as the cleaning of meat trucks, tables and benches.

The other application is the pig snout cleaner, shown in the other photograph. The same equipment is also used for cleaning the hairs and bristles from the head, eye sockets and ears. As can be seen in the picture, the flexible shaft outfit is suspended from a trolley on a monorail directly in front of the hogs. In addition to the saving in labor there is also an increase in the amount of lard secured from the heads. This is because there is no cutting, and consequently no waste, of flesh or fat when cleaning. The photograph shows the cutter, which consists of four steel blades mounted in a cone-shaped holder.

There are many other applications in the food industries of this type of equipment. Thus the wire brush is frequently used in the larger bakeries for cleaning pans, pan racks, metal trucks and table tops. Fish scaling is very efficiently performed by the use of a spindle equipped with multiple blades of spiral shape and surrounded with a shell to prevent the scales from flying around.

Portable shaft machines are also employed in grinding and polishing the inside surfaces of tanks used for



This flexible shaft cutter, mounted on a monorail, is convenient for cleaning hog snouts.

Cleaning ham boiler with wire brush or flexible shaft.

pasteurizing milk, and in the preparation of other milk products, where it is important to have such surfaces free from all roughness or indentations.

A wire brush driven by flexible shaft equipment is used by ice cream cone manufacturers for cleaning the molds when they become coated with dough. These examples from actual practice could be added to at length, but enough have been given to suggest the possibilities.—F. A. WESTBROOK, *Center Conway, N. H.*

Bottling Plant Conveyor

IN the larger carbonated beverage bottling plants where demand crowds closely upon production, a major problem is found in keeping a steady stream of bottles moving away from the crowning, or 'capping' machines. The modern equipment used in many plants keeps production at maximum speed from the platform where the empty bottles are unloaded straight on through the washing process, and through the filling and crowning machines. After capping, the inspection and crating of the bottles by hand frequently causes congestion, and results in stopping or slowing down production.

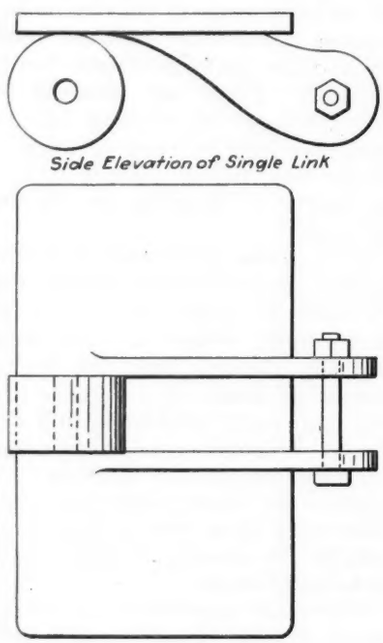
It was formerly customary to place the finished product in a case on a gravity roller conveyor at the point of crowning, after it had been inspected. On the gravity conveyor the filled case was guided by hand to another point where it was removed from the case by hand for final inspection.

This system has been replaced in some modern plants by a large, rotating disk or assembling table, at the point of crowning. With it, efficient results are obtained as it speeds up the second and final inspection and can handle the production from two machines. However, this system required an unnecessarily large amount of space to accommodate the machines and, if inspection from one quarter stopped or slowed down one machine, the other machine also had to be slowed down or stopped.

In the Coca-Cola bottling plant at Atlanta, Ga., one of the largest in the United States, this problem became a serious obstacle to meeting demand. The plant superintendent, S. W. Galloway, unable to find a chain conveyor system small enough to carry the small 6-oz. bottles, designed and built in his own shop a conveyor made up of four chains, one chain independently carrying the production of each of the four crowning machines.

The outside chain began at the far end of the machine No. 1, while the second chain began at 18 ft. away at machine No. 2. In a like manner the other two chains began at 18 ft. apart, the No. 4 machine being served by the innermost chain. It can easily be seen that if this arrangement had not been used, the man at No. 1 machine would have had to reach over three chains in order to reach *his* chain.

The entire system is driven by a single 2-hp. motor, driving one 50-to-1 gear reduction worm drive, synchronizing with the production speed of the 40-spout fillers. This keeps the finished product moving away from the machine at the same rate of speed with which they are filled and crowned, avoiding the possibility of congestion. The speed is 13 ft. per minute.



Sketch of link used in chain for bottling plant conveyor.

The conveyor chain is made of small bronze plates, 2½ in. wide by 1½ in. long, as shown in the accompanying sketch. These plates are male and female fittings, and are joined by small steel pins. As the plates on the chain carry millions of bottles per year and are exposed to great wear by friction, the chains are passed through a small 'cistern' of liquid soap. This lubricates them and reduces friction. In four years of uninterrupted operation, the chains have shown no material wear.

Important features, in addition to easy handling are the saving of space and the opportunity for one additional inspection. This latter feature has proved to be particularly useful in demonstrating to juries, investigating damage suits, that it is practically impossible for foreign matter to enter the beverage without being detected. Several hundred suits in one year have either been discharged without a true bill or pronounced fraudulent; largely, it is believed, by virtue of the present system.—J. P. PETIT, *Atlanta, Ga.*

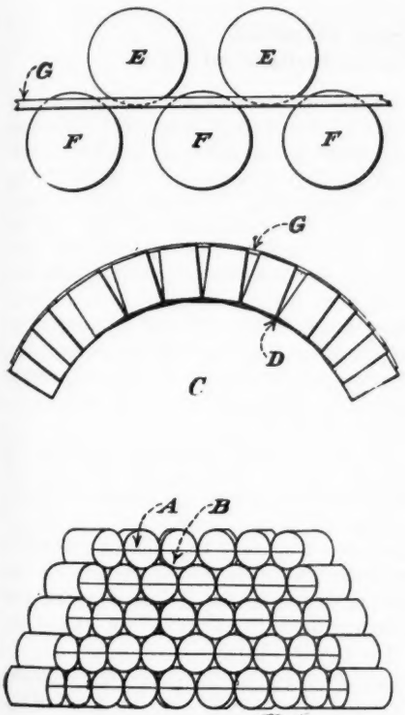
Small Parts Storage

SHOWN in the drawing is an excellent set of small storage bins, which can be made up from empty cans. A set of bins of this kind is especially useful for holding a moderate amount of nails of varying sizes, various sizes of bolts and washers, or screws. There are, of course, many other uses. But for the use named it is a great aid to the plant maintenance man.

It is quite possible to stack the cans in a straight-line formation, simply soldering them together along the various lines of contact, but by using the method shown, the bins as a whole are more readily accessible. The sketch at the top, left, shows the plan view, of which the sketch below is the elevation of the front of the bins. It will be noted that the front ends of the cans are only partly open, thus guarding against easy spilling of the contents. The open area is indicated at *A*, but the area *B* is closed by soldering in a piece of sheet metal cut to fit the front of each bin.

Notice that by standing in the position *C* in front of the bins, one can see directly into all of them without shifting his position, and can easily reach into any one of the entire assembly. These are the advantages of arranging the bins in circular form.

The front ends of the cans of course come directly into contact, and are soldered directly together. Where the circular formation is employed, however, the back ends of the cans do not contact directly, but take the relative positions indicated in the sketch at the top of the drawing.



Small parts storage made from cans.

Therefore, where the front ends of the cans are soldered directly together as at *D* in the plan, the back ends are secured and held in proper relative position by means of tying strips of light metal bent around the circular arc, so that each strip overlaps two courses of the cans. Thus, in the sketch, course *E* and course *F* are securely fastened together by the binding strip *G*, which is soldered to them in the position indicated.—J. E. HYLER, *Peoria, Ill.*

Joining Round Belts

A SIMPLE method of joining the ends of round leather strips, in order to make endless belts, is as follows:

Procure a wooden block about 3 in. long, and drill it lengthwise with a hole of the same diameter as that of the belt. Then cut the block into two halves so that the drilled hole is split lengthwise on its center line and half of it appears in each half of the wooden block.

Next shape the ends of the belt to give a scarf lap about 1 in. long. This is done by cutting diagonally across the leather.

The next step is to apply belt cement or glue to these tapered ends and to place them together. Then line the hole in the wooden block with paper. Place the glued joint in the belt in the half drill hole in one half of the block. Put the other half of the block over this. Then clamp the two halves of the block tightly around the belt joint.

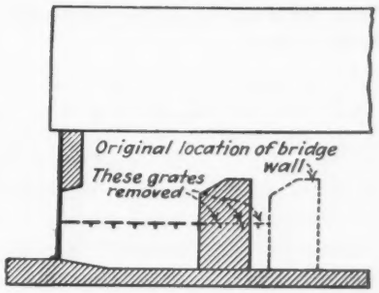
After standing for one or two days, the joint will be set. Before using the belt, smooth off the joint with fine sandpaper.

Is Your Boiler Too Large?

OFTEN boilers are installed having a capacity greatly in excess of the maximum peak of steam demand. Engineering errors in the design of the plant, or anticipation of future plant expansion, are the most common reasons for selecting boilers that are too large for the job that they are to do.

Boilers operated at ratings far below their capacity are inherently wasteful and hard to control. Heat loses from radiation, air infiltration, and poor combustion, are greatly magnified when considered in proportion to the steam demand. In addition to these losses, the alternate heating and cooling of the boiler and its setting, incidental to erratic pressure control, increases the cost of maintenance per pound of fuel burned, thus adding appreciably to the overall cost of steam.

When firing coal in an oversize boiler the losses due to poor combustion can often be minimized, and a substantial fuel saving effected, by blanking off a portion of the grate surface. Too much great area for a given load necessitates carrying a thin, cold, irregular, and insufficient fuel bed. Decreasing the grate surface will overcome these difficulties and enable the maintenance of a relatively hot, efficient, and easily controlled fire. As shown in the sketch, this reduction of grate area was accomplished in one installation by removing a number of grates from the rear



Decreasing the grate surface of an oversized boiler reduces the coal bill.

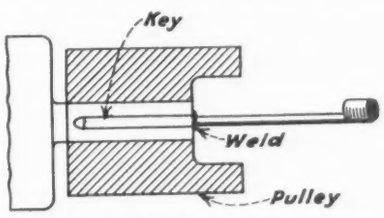
of the furnace and moving the bridge wall forward.

Another instance may be cited where the process steam requirements of a large seasonal food manufacturing plant were supplied by one 300 hp. and two 160 hp. high-pressure stoker-fired boiler units designed to operate a 200 per cent of rating. As the steam load was confined to the summer months, it was necessary to use one of the 160 hp. boilers to handle the winter heating load, which, under the most severe weather conditions, never exceeded 40 hp. Fuel consumption during the heating season was greatly reduced by the installation of a small low-pressure heating boiler having a capacity commensurate with the average heating steam demand.—S. H. COLEMAN, *Roanoke, Va.*

Removing Keyed Pulleys

IT IS sometimes difficult to remove a pulley from a motor or shaft without damaging it. This trouble is generally caused by the tightness of the key.

A simple method of taking out the key, so that the pulley can be removed without harm, is shown in the accompanying drawing. An iron bar, 3 or 4 ft. long, is welded to the exposed end of the key. On the other end of the bar a small block of iron, about 2½ in. square and 3 in. long, is welded as shown. If the welds are secure,



Method of Removing Keys That Stick.

it is then a simple matter to back the key out of the keyway by striking the side of the block that is toward the pulley with a hammer or other convenient tool.

NEW DISCOVERIES AND INVENTIONS

BRIEF REVIEWS OF NEW METHODS, PROCESSES, RESEARCH AND PATENTS IN THE FOOD INDUSTRIES

New Method of Concentrating Fruit Juices

THE RECENTLY DEVELOPED Krause-Linde process has given a new slant to the old problem of dewatering or concentrating food and beverage products, especially those in which the loss of volatile matter during evaporation is detrimental. Concentration by freezing is an old but not entirely satisfactory solution. It is complicated by entrainment of insoluble substances in the ice crystals, and also the mechanical difficulties of separating the ice from the concentrate. By allowing the ice crystals to grow in an annular or ring-shaped cell Krause and Linde obtained a texture of slush which greatly aided separation of the ice from the liquid by centrifuging. It gave a more concentrated extract and a purer water melt than had ever been obtained.

The first industrial application of this method was with grape juice, with results which surpassed even the expectations of the inventors. The concentrate can be diluted to a perfect equivalent of fresh grape juice; in fact, the flavor is slightly improved by removal of tartrates. Most surprising of all, the water from the melted ice was found to have valuable medicinal properties, and a number of European clinics are now making tests to ascertain the full extent of the possible therapeutic uses of the new pharmaceutical product from grapes. Technically, the process involves freezing the juice at —13 deg. F., followed by centrifuging. The process may be repeated once or twice, according to the strength of concentrate desired.

Abstracted from "Latest Observations With the Krause-Linde Process for Stabilizing Food Products", by L. Engelhardt. *Angewandte Chemie* 49, 588, 1936. (Published in Germany)

Yarovization of Cabbage Seed Increases Yield 10.5 to 30 Per Cent

YAROVIZATION is apparently the same as vernalization, and neither word is in Webster's dictionary. It is presumably the process of holding the seed at low temperature before planting. Applied to early cabbage in Russia, by holding the seed for 30 to 130 days at 2 to 6 deg. C., the heads produced from it were 10.5 per cent heavier than those produced from unyarovized (a swell word) seed.

Abstracted from "Reaction of the Drumhead Cabbage to Lowering of Temperature" by L. V. Michajlova. *Comptes Rendus (Doklady) de l'Académie des Sciences de l'URSS* 2, 199, 1936. (Published in Moscow)

Thinning Egg Whites

USE of enterokinase, benzoyl glycerine, and similar trypsin activators for the thinning of fresh egg whites is dedicated to the free use of the U.S.A. public through U.S. Patent No. 2,054,213, granted Sept. 15 to Arnold K. Balls, Washington, D. C., and Theodore L. Swenson, Chevy Chase, Md.

Thinning is desirable because in that condition egg whites dry faster, are easier handled in the drier, and give a product more completely soluble in water than do thick egg whites.

A standard procedure heretofore has been to let the whites "ferment" for a considerable length of time before drying. This "fermentation" is in fact a breaking down of the egg whites through protein-splitting action. Bacterial action and undesirable protein decomposition may also result.

Egg whites naturally contain trypsin which brings about the desired type of egg white thinning. But the egg whites contain this trypsin in an inactive state which slowly changes to the active state during storage or upon exposure to air after breaking. Through the addition of activators as described in the patent this trypsin becomes active at once and thins the egg whites while they are still fresh and sweet.

If enterokinase from intestines of pigs is used, 1 lb. of the dried intestinal lining is sufficient to cause the thinning of 2,000 lb. of egg whites in 24 hours or less. The preferred temperature range is between 30 and 40 deg. C. Occasional or very slow agitation helps.

If such benzoyl derivates of amino acids and peptides such as benzoyl glycerine, are used, 1 lb. of the activator will liberate trypsin to thin 5,000 lb. of egg whites. These ratios may vary with the eggs.

These activators work when added in the dry state but water solutions of them are easier to handle. Egg whites already partly thinned should be freed of thinned portion before treatment. Considerable saving in quantity of activator needed can be made.

Stops Bacterial Decomposition of Fish

THE PRODUCTION of the inedible menhaden oil from the fish of that name has long been an ill smelling business. But with the development of a new preservative, "Aquacide," it is possible to prevent the decomposition of the fish in the ships before the fish are landed. The new industrial antiseptic is the development of L. T. Hopkinson, Fisheries Expert, U.S. Tariff Commission. Aquacide has a low boiling point, disappears on rendering or drying, costs about 35 cents per ton of fish preserved with it.

At sea, a vessel having a capacity of 500,000 lb. of fish carries 25 gal. of Aquacide, dilutes it one-eighth to one-fourth of 1 per cent with sea water and sprays it over the fish in the hold. It is repumped from the bottom of the hold and resprayed. The chemical, the composition of which is not stated, is made by du Pont.

(It may possibly have some application for other industries for preventing decomposition of inedible waste materials.—Ed.)

Abstracted from "New Chemical Process Introduced in the Fish Rendering Industry", *Fishing Gazette* 53, p. 12, July, 1936.

Synthetic Sugars from Glycerin

A NEW synthesis of sugar has been reported from Switzerland. It is not in any sense a threat to the producer of natural sugar; but it is interesting as one more example of how scientific research is slowly but surely surmounting the barriers which have stood between man's curiosity and his understanding of the processes of nature. The sugars which have now been prepared in the laboratory are not the same as cane or beet sugar; one is fruit sugar (fructose), the sugar of honey and of many fruits. The other is sorbose, which is found in mountain ash berries but is not

commercially important. The raw material used in the new synthesis is glycerin; though not an extremely high priced product it would be rather an expensive material if a commercial synthesis were contemplated. The new method is a remarkable improvement over previously known processes for making sugars in the laboratory because it requires only two chemical operations, and the yield from the final operation runs as high as 95 per cent. Thus synthetic fruit sugar is brought within the realm of possibility, with commercial adaptations not immediately visible but perhaps on the horizon.

Abstracted from "Synthesis of Fructose and Sorbose From Glyceric Aldehyde," by H. O. L. Fischer and Erich Bauer, *Helvetica Chimica Acta*, 19, 519, 1936. (Published in Switzerland.)

Yabunikukei Seed Fat — A Substitute for Cocoa Butter

A JAPANESE plant which belongs to the cinnamon family (its Latin name is *Cinnamomum pedunculatum*) is introduced to the Occidental world by its Japanese name for want of a better; they know it as "yabunikukei." Its seeds contain a solid yellow fat which is of some interest to Japanese soap manufacturers. It has interested Japanese chemists even more, and they have found that its principal ingredient is capryldilaurin. The name at once tells chemists, the world over, a great deal about the composition and nature of the fat but means little to a manufacturer of candy or food products. It does mean, among other things, that this fat is chemically rather different from most of its relatives in the vegetable and animal world. Accordingly, the Japanese chemists went further into the question and emerged with a fact of considerable practical importance. By hardening the yellow fat, in the same way that cooking fats are made from cottonseed oil in this country, they got a fat which proved to be an excellent substitute for cocoa butter in making confectionery products. The invention is covered by Japanese Patent No. 110,986; but the investigation is still going on and other uses for the fat may be found.

Abstracted from "Seed Fat of Yabunikukei," by Y. Toyama and T. Tsuchiya. *Journal of the Society of Chemical Industry*, Japan 39, 261-2B, 1936. (Published in Japan.)

Lactic Acid from Starch

LACTIC ACID, the acid of sour milk, is commercially produced from sources other than milk and has a number of uses in the manufacture of food products. Fermentation processes have been favored for cost and efficiency reasons; and now a new method is offered which makes it possible to make lactic acid from unsterilized starch mashes, which rank among the cheapest of raw materials.

As described in Austrian Patent 146,479, granted July 10, 1936 to the firm of Hauser and Sobotka in Vienna, it is not even necessary in the new process to hydrolyze the starch to soluble sugars by acid treatment before the fermentation. This effect is obtained as part of the fermentation step by adding starch-fermenting enzymes to the mash. Careful acidity control is essential, as in other fermentations. Under the conditions disclosed in the patent the fermentation is complete with substantially no unfermented residue, and the yield of lactic acid is high. Thus, with a simplified fermentation process and a cheap raw material the production cost for lactic acid is materially reduced.

French Method of Puffing Grains

EVEN corn, the common field corn which made Iowa famous, can be "popped" or puffed by a new method which is an improvement on the familiar process by which wheat and rice are "shot from guns."

As disclosed in French Patent 799,378, made public June 11, 1936 as a grant to Wm. J. Plews, cereal grains are heated in a sealed container under a pressure of at least 105 lb. per square in., or as high as 225 lb. per sq. in. if desired, with superheated steam. The temperature in the container is at least 285 deg. F. and may be as high as 330 deg. F. After a definite time interval, which depends on the cereal and the operating conditions, but is not more than five minutes, the pressure is suddenly released and a puffed grain is obtained. There is no risk of deteriorating the fat or oil contained in the seed germ; the seed fats will withstand much higher temperatures than those specified. When corn is to be puffed about 3 per cent of salt is added.

Are Bamboo Shoots Poisonous?

IN THE Dutch East Indies, as in other regions where bamboo is plentiful, the young shoots are used as a vegetable; and yet it has been found that they contain the deadly prussic acid, HCN, sometimes in a proportion as high as 1 part in 700. The young shoots also contain water-soluble oxalates, which are not nearly so violently poisonous as prussic acid but still are dangerous. Boiling, under conditions permitting evaporation, drives out the prussic acid and probably converts the oxalates to insoluble or harmless substances; hence the boiled shoots may be safely eaten. In preparing the food products known in the East Indies as "atajar rebung" the shoots are boiled. They should never be eaten raw. Bamboo leaf, which is also sometimes used for food, contains no prussic acid and can be eaten raw.

Abstracted from "Are Bamboo Shoots Poisonous?", by Arie Goudswaard, *Pharmaceutische Tijdschrift Nederlandsch-Indie*, 13, 97, 1936. (Published in Java.)

Storage Conditions for Corn Meal

TO PREVENT changes of the crude fat content of corn meal the authors recommend the following: When the moisture content is 14 per cent or higher the storage temperature must be maintained at 18 deg. C. (64.4 deg. F.) or lower. When the moisture content is less than 8 per cent the storage temperature may be as high as 37 deg. C. (98.6 deg. F.).

Abstracted from "Changes in Stored Corn Meal" by C. O. Willits and F. J. Kokoski. *Ind. and Eng. Chem.*, 27, 1494, 1935.

Sweet Potato Chips

POPCORN, peanuts, and white potato chips have acquired another rival for the circus-going and sport-loving nickel.

According to U.S. Patent No. 2,056,884 chips may be made from sweet potatoes. The potatoes are washed, sliced, and cooked for eight minutes in fat at a temperature ranging from 302 to 248 deg. F.

This patent was granted Oct. 6 to Byron C. Brunstetter, Washington, D. C., who has made it available for free use by the general public.

N.B.: These items are abstracts. They are not original articles. Furthermore they are factory men's abstracts, not chemists' abstracts. Also they represent the editor's interpretation of a scientific discovery in terms of factory practice. The scientific article or patent reads quite differently from what you see here.

Do you want more of these? Please write your wishes to the editors.

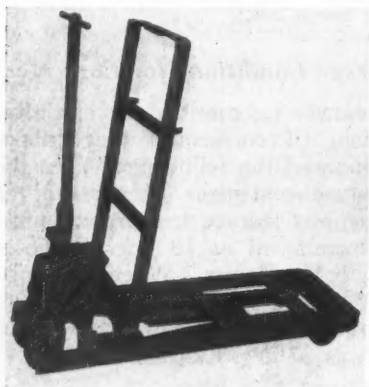
NEW EQUIPMENT FOR FOOD MANUFACTURERS

Variable Speed Drive

ALLIS-CHALMERS MFG. Co., Milwaukee, Wis., has developed a variable speed "Texrope" drive called the "Vari-Pitch." It consists of a "Texrope" V-belt drive having one or both sheaves arranged to permit adjustment of the grooves. This provides a larger or smaller diameter, resulting in an increase or decrease in the speed of the driven shaft. The drive has a range of speed variation from 15 to 25 per cent per sheave. It is available in capacities from 1 to 60 hp. Constant belt tension is maintained by an arrangement which moves the motor to compensate for the groove adjustment.

Fork-Type Hand Truck

A HAND OPERATED factory truck of the fork type, for use in the pallet system of handling has been developed by Yale & Towne Mfg. Co., Philadelphia, Pa. This truck has a tilting fork and a counterweighted front. It will handle both single and double-faced pallets. Only one man is required to operate it. Model KATC, shown in the illustration, has a capacity of 700 to 1,125 lb. and is equipped with forks measuring 31½ in. long and 2 in. wide.



Fork-type Hand Truck.

Portable Elevator

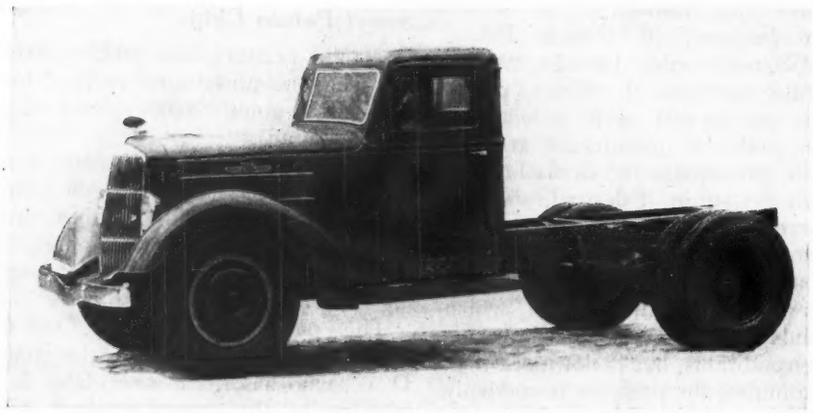
A NEW design of portable electric elevator is being made by Barrett-Cravens Co., 3255 West 30th St., Chicago, Ill. This elevator is available in any size of platform, for any height, and in capacities from 500 to 5,000 lb. Features include direct motor drive, ball-bearing motor and hoist, electric solenoid brake and three-point suspension of hoist.

Recent Reo Trucks

A LINE of 3-5 ton and 4-6 ton heavy duty trucks is being marketed by Reo Motor Car Co., Lansing, Mich. Base chassis price ranges from $1,745 up for the smaller model, and from $2,775 up for the larger. Modern lines and de luxe, 56 in. wide cabs are used in these models.

Six models are offered in the 3-5 ton class, in wheelbases from 153 to 185 in. Gross capacity ratings range from 18,000 lb. to 20,000 lb., and from 30,000 to 35,000 lb. in tractor-trailer operation.

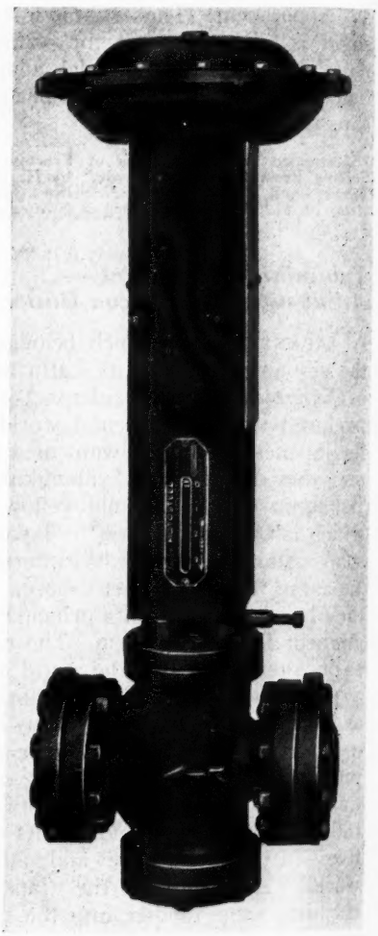
Three models are available in the 4-6 ton class, with wheelbases ranging from 156 in. to 190 in. Capacity ratings are from 22,000 lb. to 40,000 lb.



Reo heavy duty truck.

Belt Pulley Bandage

SCANN-AMERICAN Sales Service, 200 Broadway, New York, N. Y., is now marketing in this country the "Contrasit" belt pulley bandage. This is a specially constructed cover for application to belt pulleys. Its use is said to insure even pull, eliminate belt slippage, permit operation of slack belts, and do away with the need of belt compounds.



Diaphragm valve motor.

Diaphragm Valve Motor

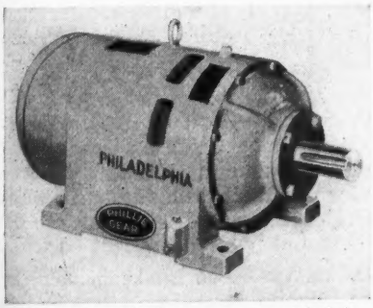
A SMOOTHER, quicker acting and more powerful valve motor is claimed to be obtained with its redesigned line by Taylor Instrument Companies, Rochester, N. Y. The design employs all-steel welded construction. Other new features include a larger molded diaphragm; a top plate designed for freer access of air pressure to the diaphragm in starting, insuring a greater effective initial force; and a longer, larger diameter spring which gives greater initial compression, less hysteresis, and more accurate response. An anti-friction bearing stem guide provides free rolling action through the entire stroke. Parts are fully enclosed. An indicator is provided showing valve opening.

Adhesives

THREE new adhesives have been developed by F. H. Perry Co., 1533 Riverside Drive, Cincinnati, Ohio. They are: "Kraft-Seal" powdered glue, for sealing all types of shipping cases, including Fourdrinier sulphite liners; "Eureka" labeling glue, which adheres to any metal or lacquer, and is said to be highly resistant to climatic changes; "No. 805" bottle labeling glue for hand or machine work, especially formulated for all types of metal foil labels.

Reducing Geared Motors

TWO MORE SIZES have been added by Philadelphia Gear Works, G Street and Erie Ave., Philadelphia, Pa., to their standard series of totally inclosed fan cooled "MotoReduceRs," in both the horizontal and vertical types. Model 405 is a 20 to 30 hp. unit, with output speeds available from 15 to 480 r.p.m., depending on the type. Model 445 is a 40 to 50 hp. unit with output speeds from 15 to 450, depending on the type. Types available in these models are single, compound and double, horizontal and vertical units.



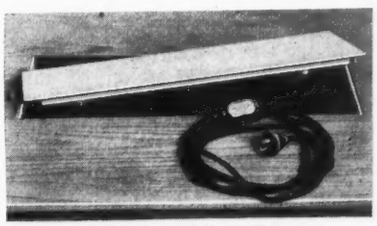
Motor with reducing gears mounted in same frame, on same base.

Motor Drive

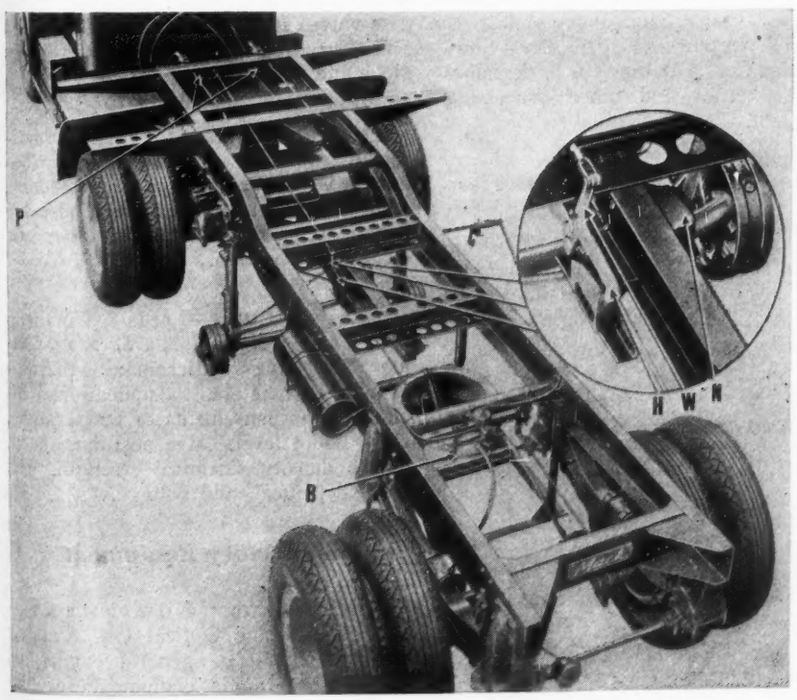
PATTERSON Foundry & Machine Co., East Liverpool, Ohio, has developed a new motor drive for pebble mills, ball mills, mixers and other equipment. This is of the built-in motor type, with helical gears in the reducing unit. It has a magnetic brake built in so that when the stop button is pushed, the machine stops immediately. It also has an inching button, permitting the machine to be inched over into correct position for loading or discharge. Sizes available are from 1 to 100 hp.

Sealing Devices

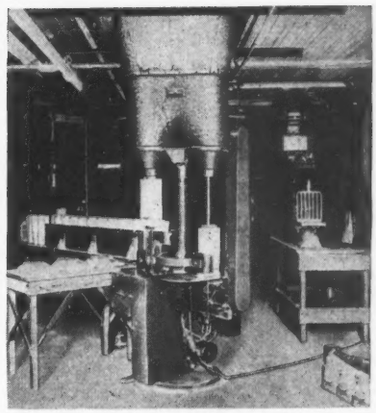
ELECTRICALLY HEATED plates for sealing packages that are wrapped in waxed paper or in heat-sealing transparent cellulose sheet, have been developed by Oliver Machinery Co., Grand Rapids, Mich. Two types are available. One of these is a "Seal Plate." This is a unit 6x10 in. on the top, and 3 in. high. It comes with cord, plug, switch, adjustable thermostatic control, and rubber



Flush sealing plate.



Safety device for semi-trailers.



Two-station, automatic, auger type packer-weigher.

feet. Several of these units can be arranged side by side if desired.

The other unit is called a "Flush Plate," and is shown in the accompanying photograph. It is a sealing plate made so that it can be inserted in the top of a work table or counter, flush with the surface. The standard size is 7x22 in. It is supplied with thermostatic control, cord, plug, and switch.

Packer-Weigher

AN AUTOMATIC, two-station, auger type packer-weigher has been developed by J. L. Ferguson Co., Joliet, Ill. The machine shown in the illustration is the first of this model installed, and is filling flour into bags at Crete Mills.

Operation is automatic. An operator slips a bag over the packing station tube, as shown in the picture. It is bulk auger packed, dribble check weighed at the next station, and discharged onto a belt conveyor. The unit illustrated is designed for 1 to 5-lb. bags, and will fill 18 to 20 of the 5 lb. size per minute, with higher speeds on smaller bags. Units for bags up to 12½ lb., and for other containers, are available.

Safety Device For Semi-Trailers

THE "COINCIDENTAL Safety Lock" for semi-trailers is a safety device introduced by Mack Trucks, Inc., 25 Broadway, New York, N. Y. The purpose of the lock is to eliminate nose dives, runaway trailers, dragging trailer brakes, and driving with the support wheels down. The action of the lock is automatically controlled by the normal functioning of the support wheel.

The principal element of the device is an auxiliary fifth wheel lock which prevents accidental uncoupling. The device also controls the automatic parking brake so that, whenever the support wheels are lowered, the brake is set; and it is not released until the wheels are raised. In addition, there is a safety hook, which prevents the raising of the support wheels or the release of the parking brake until the tractor part of the fifth wheel has been backed fully home so that the king pin latch trips.

THE MANUFACTURERS OFFER

Food Plant Equipment

1. CANNING EQUIPMENT—F. H. Langsenkamp Co. Sixty page loose-leaf catalog of general line of equipment for canning plants, including kettles and cooking coils.

2. EVAPORATORS—Buffalo Foundry & Machine Co. Bulletin 290, a general catalog of various types of industrial evaporators made by this company.

3. EVAPORATORS — Manistee Iron Works Co. Bulletin No. 7, describing single and multiple effect vacuum evaporators.

4. EVAPORATORS—The Pfaudler Co. Bulletin No. 726, describes vacuum pan evaporators of glass lined steel.

5. EVAPORATORS—Standard Water Systems Co. Bulletin No. 201 describes "Multicoil" evaporators with removable heating coils.

6. EVAPORATORS — Struthers - Wells Co. Circular No. 6 discusses the operation and use of the inclined high velocity evaporators made by this company.

7. EVAPORATORS—Swenson Evaporator Co. A reprint of an article by W. L. Badger entitled "Principles of Forced Circulation Evaporation."

8. EVAPORATORS—Zaremba Co. Two catalogs, one a general catalog of evaporators for many purposes; the other a catalog of recompression evaporators.

9. KETTLES—Bethlehem Foundry & Machine Co. Loose-leaf catalog of jacketed kettles, tanks with heating coils and other forms of processing equipment.

10. MAPLE SYRUP EVAPORATOR—Champion Evaporator Co. "Making the Sugar Bush Pay," a 24-page illustrated catalog describing the operation and use of evaporators for maple products.

11. MAPLE SYRUP EVAPORATOR—G. H. Grimm Co. Thirty-two-page catalog of maple sugar maker's equipment, including evaporators.

12. MILK DRYING EQUIPMENT—Arthur Harris & Co. Catalog of milk condensing machinery, including the Harris "High Speed" milk evaporator.

13. PROCESSING EQUIPMENT—J. P. Devine Mfg. Co., Inc. Catalog No. 105-B, condensed catalog of processing equipment, including evaporating equipment.

14. PROCESSING EQUIPMENT—Sowers Mfg. Co. Catalog No. 8, describes "Dopp" kettles and other processing equipment.

Plant Supplies and Accessories

15. ELECTRONIC DEVICES—Westinghouse Lamp Co. Three publications as follows: Information Bulletin No. 1, describes the Westinghouse Lenard Ray tube for use in insect control and for experimental work on plants; Information Bulletin No. 2, describes the Westinghouse ultra-violet meter for measurement of radiation; Loose-Leaf Descriptive Bulletin No. 18 gives specifications for various types of electronic tubes made by this company.

16. GAS ENGINES—Worthington Pump & Machinery Corp. Bulletin S-550-B4B, describes the Type AG vertical 4-cycle stationary gas engine for industrial use.

17. MOTOR—General Electric Co. Bulletin GEA-1974, describes the general purpose squirrel-cage induction motor, Type K, in fractional horsepowers from ⅙ to ¾, standard speeds, 110, 220, 440 and 550 volts, 2 and 3 phase, all commercial frequencies.

18. STEAM TRAPS—Yarnall-Waring Co. Two new publications: A 4-page bulletin entitled "What Makes the Yarway Steam Trap Work," discusses the construction and operation of the trap; a folder, T-1721, also gives construction and operating features of the Yarway trap.

19. STOKER—Combustion Engineering Co. Catalog SU-5, a 24-page illustrated bulletin of the CE-Skelly stoker unit for the mechanical firing of bituminous coals.

20. VALVES—The Lunkenheimer Co. Three bulletins describing valves as follows: Circular No. 54, "King-Clip" demountable gate valves for gas, steam, water and other fluids; "Causal" metal gate valves for use in corrosive service; and Fig. 123 "N-M-B" non-metallic globe and angle valves.

21. CONTROL INSTRUMENTS—Practical Instrument Co. A folder describes and gives specifications for 24-hour recording instruments of two kinds, one for air temperature and the other for electrical operation.

22. PYROMETERS—Leeds & Northrup Co. Catalog N-33-A is a 52-page catalog describing "Micromax" thermocouple pyrometers. Applications include the measurements of temperature, CO_2, liquid level, valve position, speed, smoke density, chemical strength, pH, frequency, load, and voltage.

Laboratory Equipment

23. LABORATORY EQUIPMENT—Bausch & Lomb Optical Co. Catalog E-21 is a 28-page general catalog of photo-micrographic equipment for the laboratory.

G. L. Montgomery, Managing Editor, Food Industries, 330 W. 42nd St., New York, N. Y. November, 1936

TO THE READER: Use this convenient form to order the bulletins you need.

Please obtain for me the bulletins indicated by the following numbers.....

.....

.....

Employer..... Your Name.....

Position..... Your Address.....

PROMOTING THE PRODUCT

▶ LIFE SAVERS CANDY Co., Port Chester, N. Y., is providing motorists with a safety emblem. To be attached to the rear license tag, it pictures a Life Saver and carries this message: "Be a Life Saver—Drive Carefully."

▶ H. J. HEINZ Co., Pittsburgh, launched an extensive fall newspaper campaign last month. It will run for nine weeks in 156 newspapers of about 109 cities. The company also recently introduced a nation-wide radio program over a CBS network.

▶ NATIONAL BISCUIT Co., New York, has gone on the air with a half-hour radio series, "Twin Stars." It is broadcast Friday night over the NBC blue network.

▶ PHILLIPS PACKING Co., Cambridge, Md., recently started an intensive newspaper campaign in Philadelphia. Daily announcements over three radio stations supplement the campaign.

▶ ICE CREAM MERCHANDISING INSTITUTE has been reorganized. Arrangements have been made with the Ice Cream and Dairy Advertising Association to render financial support to the institute under a cooperative plan. Point of sale advertising will be prepared.

▶ PET MILK SALES CORP. is conducting a 30-minute broadcast over a CBS hook-up of 62 stations. Entitled, "Your Pet Program—the Saturday-Night Serenaders," the broadcast features Mary Eastman, lyric soprano.

▶ STANDARD BRANDS, INC., New York, is now using the Rudy Vallee Variety Hour to promote Royal Gelatin. The company has another radio program, "We, the People," which is on the air for 30 minutes on Sunday evenings in the interest of Calumet Baking Powder.

▶ WISCONSIN is spending $50,000 on national advertising of dairy products. It is using store-display material, including a six-color counter sales basket.

▶ ANHEUSER-BUSCH, INC., St. Louis, is using five newspapers to announce the introduction into New York of Budweiser beer in cans.

▶ GENERAL MILLS, INC., Minneapolis, has a new program, "Football Flashes." on the air over WOR on Saturday afternoons. It promotes Wheaties.

▶ ALASKA PACKERS' ASSOCIATION has increased the advertising appropriation for canned salmon by 50 per cent.

▶ CALIFORNIA FRUIT GROWERS' EXCHANGE, Los Angeles, plans a $100,000 expenditure for newspaper advertising in its central districts during 1937.

▶ W. K. KELLOGG Co., Battle Creek, Mich., is broadcasting football human interest stories over WOR on Friday evenings.

▶ NATIONAL CHEESE INSTITUTE will make Nov. 8-14 the fourth annual National Cheese Week.

▶ FREDERICK & NELSON, Seattle, dates its cakes as a guarantee of freshness. The company uses dated eggs and advertises the fact widely.

▶ CHRISTIAN FEIGENSPAN BREWING Co., Newark, N. J., has adopted a quart bottle which it promotes as a convenient container for the family.

▶ VAN DE KAMP'S HOLLAND DUTCH BAKERS, Seattle, is promoting two-layer cakes by providing accessories necessary to convert them into "merry-go-rounds." It gives away a paper canopy and sells stick candy to be used as poles to support it over the cake. Then the bakery sells animal cookies to go under the canopy.

▶ G. KRUEGER BREWING Co., Newark, N. J., is broadcasting "Krueger's Musical Toast" over sixteen stations of the NBC red network on Monday evenings.

▶ DINA-MITE FOOD PRODUCTS Co., a California concern, is using newspaper advertising and sampling to introduce its cereal in the Chicago territory. Point of sale displays and a recipe book will tie in with the advertising. Campaigns in New York and New England will follow.

▶ BORDEN Co., New York, is running four-color pages in November issues of a wide variety of magazines and in a large list of Sunday newspapers to announce a new hot-dish pad.

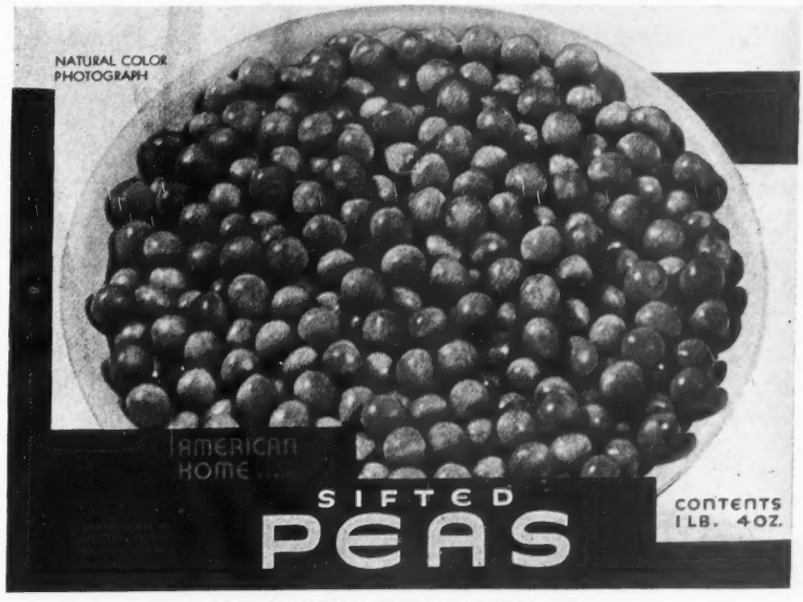
▶ NATIONAL SUGAR REFINING Co. has dramatized easy ways to remember when to use Extra-Fine Powdered Sugar and Confectioners XXXX in a new series of consumer advertisements.

▶ G. WASHINGTON COFFEE REFINING Co. recently put Jim McWilliams on the air in "Uncle Jim's Question Bee." It is a Saturday-evening program.

▶ CITY BREWING CORP., Long Island City, N. Y., is giving two cans of beer to consumers who obtain "guest cards" by sending in newspaper coupons.

▶ CRANBERRY CANNERS, INC., has introduced an intensive national fall advertising campaign, using full-page color advertisements in 23 newspapers and supplementing these with black and white copy and with radio broadcasts.

▶ OWENS-ILLINOIS GLASS Co. is sponsoring a national publicity program to increase sales of peanut butter.



LABEL SHOWS PEAS AS THEY ARE

Natural color photographs of the product are now being used to illustrate labels for canned food. This type of label is believed to be more informative as well as more appealing to the appetite. The one shown here is from a can of peas distributed by National Tea Co.

New PACKAGES and PRODUCTS

Fried Pies

PIES that are turned over, sweetened with honey, fried and then coated with honey are a new product in Seattle. About the size of baked turn-overs, but actually fried, these pies have a ten per cent soya flour crust and are filled with a variety of fruits. The product is put up in open-mouthed waxed-paper sacks and vended through grocery outlets or by concessionaries. Public response to this innovation in foods is said to have been excellent.

Paper Baking Plates

IT IS NOT necessary to bake pies on tin plates and then transfer them to paper plates for delivery. A paper plate developed by Simmons Paper Products, Inc., Warsaw, Ind., is used both for baking and for carrying the pie to the consumer. Processed with a special lacquer, the plate is said to be greaseproof and to withstand oven temperatures up to 500 deg. F. During baking, the plate increases in rigidity, and it comes from the oven with an appetizing tan color, the manufacturer says. Use of this plate eliminates the labor of transferring pies to paper plates and does away with washing tin plates.

Woodfire Flavor

WOODFIRE BRANDS, INC., Cincinnati, believes that everybody likes the flavor of food cooked over an open wood fire. So the company has developed a flavoring agent said to impart that taste. It is intended for use by the housewife in cooking meats and in making sauces for meats. The product is supposed to contain only the natural flavors and aromas arising from burning wood in the open. The flavor is distributed in a 5-oz. bottle with a bright red cap and with stipled gold foil around the neck for decoration.

Good Packages for Nuts

STRONG eye-appeal and protection of freshness are embodied in new packages for salted nuts developed by Tas-T-Nut Co., Baltimore. Using an air-tight, transparent-cellulose bag, the company has worked out three package variations. One, called "Color-Glo," has both edges reinforced and decorated with red and blue strips of colored cellulose. Bearing no label, this bag is placed in a display box in the store. A second style of container has been made by placing a fold-over label over one end of this "Color-Glo" bag. The third package, called "Sho-Pak," consists of the cellulose bag laid on a backing of heavy paper, the edges of which are folded over and stapled to form a frame for the bag. The back and edges of this frame are printed with label and promotional information. Bright colors make it catch the eye.

But the cellulose bag itself is the most interesting part of these containers. It is a good production package similar to that used by Henry Heide, Inc., for packaging candy (FOOD INDUSTRIES August, 1935).

Container is Dispenser

Two promotional advantages are gained by using the container-dispenser adopted by Chr. Hansen's Laboratory, Inc., Little Falls, N. Y., for Junket. The product is placed on display and the storekeeper can get at it easily. The display-container, made of cardboard attractively lithographed to illustrate the desserts and ice cream which can be made with Junket, is shipped to the store filled with cartons. A tab is attached to one end for hanging, and a removable panel at the opposite end exposes the bottom carton and permits it to be pulled out. As one carton is removed, another falls into place before the opening. Slots in the side of the dispenser show how many packages remain.

Rolling-Pin Package

FLAKY PIE CRUST is best achieved when the dough is chilled before baking. This is a well-known fact, but Shenandoah Valley Apple Cider & Vinegar Corp., Winchester, Va., probably is the first food manufacturer to capitalize on it. Although it is a far cry from vinegar to pie crust, the company saw that it could render a service to the housewife, and incidentally to itself, by packaging vinegar in a glass rolling pin. When empty, this container can be filled with cold water or chipped ice and used to chill the dough while rolling it. The package contains one pint three ounces.

Box Displays Prunes

MOST WOMEN want to see prunes before they buy them to make sure they are plump and meaty. So when Sprague, Warner & Co., Chicago, decided to repackage its prunes, the company put them in cardboard cartons with transparent-cellulose windows. And in doing this the concern was not unaware that the package would make a striking display either in mass, in the window or on the counter. And such a display will effectively remind the housewife to purchase the product. As a further salesmaker, recipes for preparing prunes were printed on the sides of the carton. These new packages contain 3 lb.

Herring—Four Styles

FOUR new forms of herring have been developed by Gorton-Pew Fisheries Co., Ltd., Gloucester, Mass., after considerable research and experimentation. Made from fresh, whole herring, these include Cut Roll Mops, Roll Mops, Cut Herring and Spiced Herring. The Cut Roll Mops are small slices of herring rolled around pickels or onions, while Roll Mops consist of a large, or whole, herring rolled around these vegetables. Cut Herring consists of short slices of the fish, and the spiced product is marinated herring. Each of these products is cured in vinegar and spices and packed in the same vinegar juice. And each is put up in pint, quart, half-gallon and gallon glass jars which attractively display the contents.

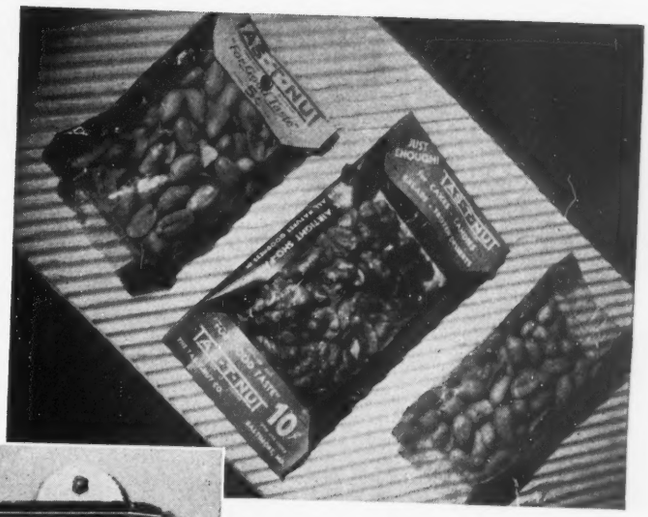
Fried Potatoes in Cans

FRENCH-FRIED potatoes are being packaged in tin cans by Normandie Potato Corp., Milwaukee, with such success that the production line operates three-shifts a day to meet the demand. In preparing the product, raw potatoes are peeled by machine, automatically cut into strips and destarched by a special process. Then the pieces are fried in vegetable shortening, toasted, salted and packed under vacuum. Cans of French-fried potatoes are turned out at the rate of 30 a minute. The illustration shows the filling and weighing operation.

English Packages

Two new cartons decorated with Royal scenes to give an English atmosphere are used for London Style Toffee by London Toffee Co., Brooklyn, N. Y. The cover of one carton portrays the Horse Guards at Whitehall, the other, the changing of the guard at St. James' Palace. These are reproductions of two posters by a well-known artist. They are printed in striking colors.

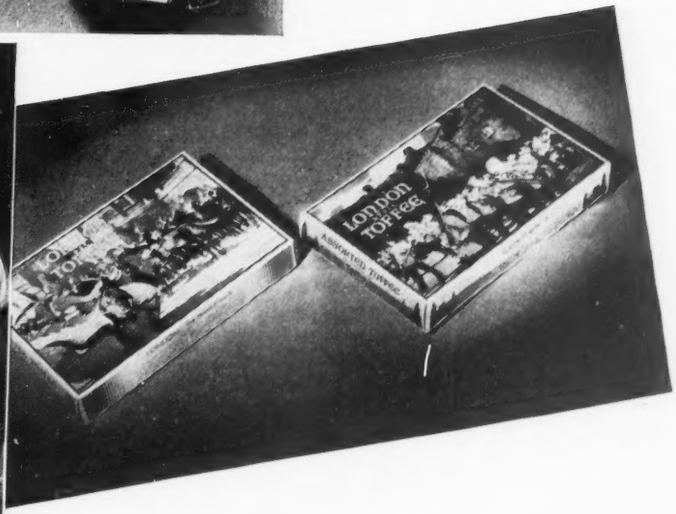
APPLE PIE
VINEGAR


TAKE-A-NUT
10¢

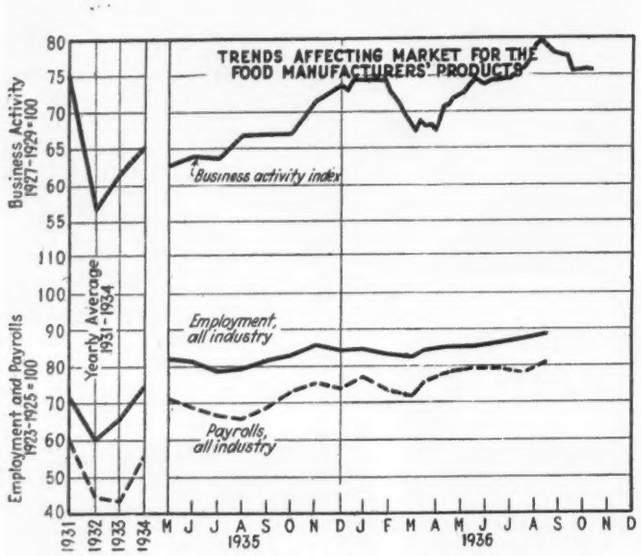
JUNKET
For making MILK into Rennet-Custard DESSERTS
and for making ICE CREAM
Price

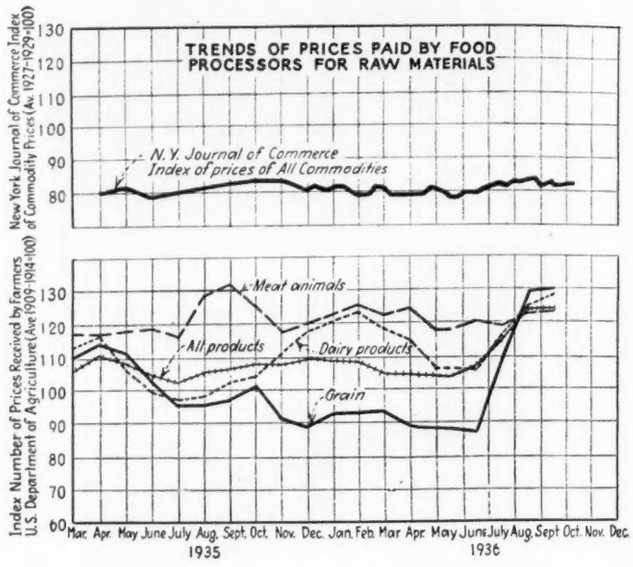
Gorton's

BATAVIA PRUNES
FERNDELL PRUNES
RICHELIEU PRUNES


LONDON TOFFEE

BUSINESS TRENDS




TRENDS OF PRICES PAID BY FOOD PROCESSORS FOR RAW MATERIALS
New York Journal of Commerce Index of Commodity Prices (Av. 1927-1929=100)
N.Y. Journal of Commerce Index of prices of All Commodities
Index Number of Prices Received by Farmers U.S. Department of Agriculture (Ave 1909-1914=100)
Meat animals
All products
Dairy products
Grain
Mar. Apr. May June July Aug. Sept. Oct. Nov. Dec. Jan. Feb. Mar Apr. May June July Aug. Sept Oct. Nov. Dec.
1935
1936

Poultry Surplus

STOCKS of chickens and fowls in storage are abnormally large at the present time. Also, the increased price of poultry feed is causing owners of flocks to kill off the non-layers. These two facts have combined to lower the prices of chickens from 3 to 6 cents per pound.

Taking advantage of these favorable prices, canners and processors of chicken are stepping up their output. Increased stocks of canned and deviled chicken are being reported from many quarters.

Meat Supply Situation

MEAT ANIMALS, in mid-October, were still coming to market in relatively large quantities, as they had all through September. Chicago receipts of cattle were the heaviest for the period in five years. Sheep and hogs were also marketed in large numbers during the past month. However, many of the animals, particularly some of the hogs and that part of the cattle that came from Western ranges, were light in weight. Hence, the tonnage of meat produced was less than receipts would otherwise have indicated.

Demand for meat has been slow, and wholesale prices have had to be held down in order to move the supply. Retailers report that the consumer demand still falls off rapidly whenever the retail price is raised. This price situation, combined with the ample supply of animals, caused prices at stockyards to fall somewhat in mid-October.

In spite of the resistance of the market to higher meat prices, it would seem that prices must rise in 1937. Excess animals, marketed now at low weights, mean a shortage of fat animals next year. And those animals that are carried over the winter will require a considerable investment in high priced feed.

Developments in Fats and Oils

WORLD supplies of edible fats and oils are reported to be short this year. Consequently, domestic producers are receiving less competition than usual, except for the imports of babassu oil, which are still negligible when compared to total oil consumed.

Temporary drops in price levels of certain fats and oils are occurring. One instance was in late September, when the relatively large supply of hogs coming to the Chicago market forced lard prices down. However, edible fat and oil prices in general are holding firm at higher levels during recent weeks.

Olive oil is one item in this group that is being watched with particular interest. Unsettled political conditions in Spain throw considerable uncertainty around the yield that may be expected from that country. Were conditions favorable, a normal yield of Spanish oil might be expected. But the continuation of the fighting into the normal olive pressing season makes it unlikely that a good output of oil will be realized. Olive oil in the other Mediterranean countries is likely to reach 438,000 short tons, compared to a yield of 474,000 short tons in those countries during the 1935-1936 season.

In view of the fact that olive oil stocks are low, the United States can expect relatively high prices in spite of a good yield in California.

Construction News

	Pending (thousands)	Awarded October (thousands)	Total Awarded 1936 (thousands)
Bakery	$115	$137	$1,567
Beverages	492	1,000	6,518
Canning and Preserving	75	.....	221
Confectionery	.....	37	67
Grain Mill Products	2,250	250	3,867
Ice Manufactured	40	140	534
Meats and Meat Products	125	200	2,537
Milk Products	470	266	1,250
Miscellaneous	609	506	5,362
	$4,176	$2,536	$21,923

Canned Vegetable Packs

TOLL taken by the drought is beginning to be apparent as additional figures on the packs of canned vegetables come to light.

The pea pack this year is now estimated at 16,178,001 cases. This compares to 23,762,324 cases in 1935. With the carryover from last year, the 1936 pack is estimated to be sufficient to allow for normal consumption.

Corn output is estimated at 13,800,000 cases, compared to 21,500,000 cases packed last year, but about equal to the five year average (1930-1934) of 13,200,000 cases.

Estimates of the current tomato pack, made by the American Institute of Food Distribution, indicate a total of about

Little Change in Business

WITH but little change the curve of business activity faltered in its upward trend during the past month.

The *Business Week* index of general business conditions fell 0.91 per cent to 75.9 per cent of "normal" during the month ending October 17.

Currency confusion and political distractions were retarding factors. Steel operations, soft coal production, electric power consumption, total carloadings, and check payments were higher. Commodity prices, machine tool and automobile sales, and building contracts slackened. Generous rains fell in drought areas with improvement in seeding and grazing conditions and a falling off in farm products and grain prices.

U. S. Department of Labor reports a decline of 0.25 per cent in the wholesale price of all commodities for the month ending October 17. Those for farm products and foods declined 0.12 and 0.72 per cent respectively. New York *Journal of Commerce* general index of weighted prices declined 3.55 during the three weeks ending October 17. Its index of grain prices slumped 3.05 per cent while that of food prices showed no net change during the same period.

23,000,000 cases, compared to 26,985,000 cases reported by the same source in 1935. In contrast, this same reporting source expects at least 25 per cent more tomato juice to be packed this year than last year.

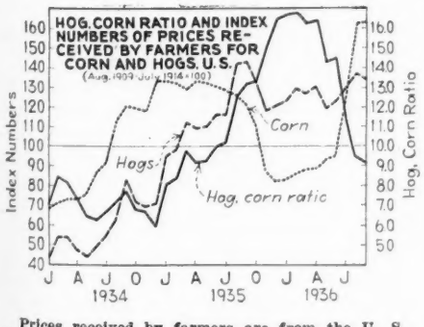
Current packs of fall string beans and cabbage for kraut are said to be running well below recent years. In contrast, the beet pack is estimated to be 10 per cent greater than in 1935, and 46 per cent above the 1929-32 average.

Dairy Trend

DURING September, the effect of the drought of last summer became apparent in both the supply of fresh milk and the prices of dairy products. More recently, in October, some change has come to lowered prices, influenced by ample rains and improved pasturage in dairying regions.

It is probable, however, that prices must swing back to higher levels as soon as winter conditions force the cattle from the pastures. Numbers of milk cows on farms in September was about 1 per cent less than in September, 1935. Milk production per cow, in September, was also less than last year, being about 7 per cent lower. This situation, combined with high feed prices may well raise prices to those food manufacturers using milk as a raw material.

Butter presents a somewhat different case. Already, toward the end of September, butter prices had reached levels high enough to allow imports over the tariff wall. Offerings from Poland, Latvia, Siberia and Russia were priced at from 32 to 34 cents, duty paid. Domestic butter prices declined at that time. And the continued threat of imports is likely to put a definite ceiling on the domestic price level, particularly after the turn in the year, when New Zealand will undoubtedly enter this market.



Prices received by farmers are from the U. S. Department of Agriculture. Employment, payrolls, wholesale prices and retail prices from the U. S. Department of Labor. The business activity index is that of *The Business Week*. The cost of living index is from the National Industrial Conference Board. Data concerning corn, hogs and the corn-hog ratio is from the U. S. Department of Agriculture.

Record Salmon Pack

CANNED SALMON reached new high levels this year, with production in Alaska a record. Final figures for Alaska, released by the Bureau of Fisheries, totaled 8,274,429 cases. This compares with 7,470,586 cases packed in 1934, the previous record year. Carryover of Alaska salmon, as of July 1, 1936, was 762,463 cases, making a total available for the current season of 9,030,175 cases.

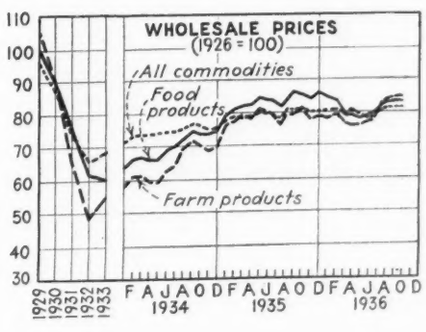
Fish Stocks Up

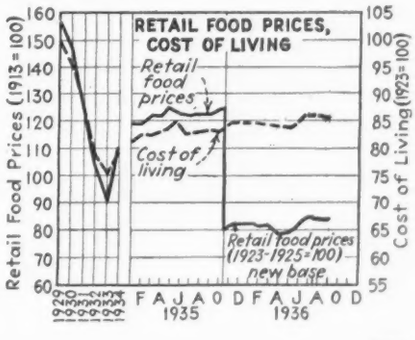
FROZEN and cured fish, in storage, is in much greater quantity than a year ago, according to reports for September made by the Bureau of Fisheries.

Frozen fish totaled 84,695,049 lb., compared to 66,539,858 lb. on the same date of 1935, and a five-year average of 63,800,000 lb.

Cured fish in September, 1935, was reported at 28,289,639 lb., compared to 15,660,128 lb. the year before, and 18,704,000 lb. as the five-year average.

These figures, combined with continued large fish landings, insure ample fish supplies for the winter season.




RETAIL FOOD PRICES, COST OF LIVING
Retail food prices
Cost of living
Retail food prices (1923-1925=100) new base
Retail Food Prices (1913=100)
Cost of Living (1923=100)
1929 1930 1931 1932 1933 1934
F A J A O D F A J A O D
1935
1936

INDICATORS

GRAPEFRUIT pack, Oct. 1, 1935 to June 1, 1936, totaled 2,410,904 cases compared to 3,747,822 cases a year previous, according to the National Canners Association.

GRAPEFRUIT JUICE pack, Oct. 1, 1935 to June 1, 1936, was 2,035,699 cases, against 2,556,124 cases in the preceding year as reported by the National Canners Association.

CLING PEACH pack in California this year was 10,231,819 cases, compared to 10,850,000 cases in 1935, according to the Canning Peach Industry Board.

RED pitted cherry pack in 1936 was 1,447,000 cases, compared to 2,562,683 cases in 1935, and 1,855,045 cases in 1934, as reported by the National Canners Association.

SUGAR DISTRIBUTION in the United States for the eight months, Jan. to June, 1936, totaled 3,982,562 long tons, raw value, down 1.2 per cent below the same months of 1935, according to Lamborn & Co.

CONFECTIONERY and competitive chocolate product sales in the United States in August, 1936, were $14,930,435, compared to $14,346,378 in August, 1935, reports the Department of Commerce.

FLOUR milled in the United States, September, 1936, was 5,458,266 barrels, compared to 5,801,756 barrels in September, 1935. Millings for three months from June 30, 1936 were 17,753,841 barrels, compared to 15,876,988 barrels for the same months of 1935. These reports are from General Mills, Inc.

COCOA DEMAND is still heavy, carrying the price above 8 cents early in October, the highest price in six years.

FEED PRICES, though still high, fell off in late September and early October, as the improved pasturage permitted the conserving of grain feeds until winter.

BEER CONSUMPTION in the United States is running at levels more than 20 per cent over the 1935 figures.

PRACTICAL PROBLEMS OF TRUCK TRANSPORTATION

DISCUSSED BY EXECUTIVES IN THE FOOD INDUSTRIES

Requirements of Truck Brakes; Methods of Testing

Question No. 18

From a safety standpoint, do you believe that:

1. All trucks, regardless of gross weight, should be capable of stopping in the same distance when traveling at the same speed?

2. If so, what distance should this be when traveling at 20 miles an hour?

3. In testing your truck brakes, how is this distance measured?

4. Can it be measured in any other way than by a deceleration meter?

5. Is it possible to obtain equal stopping distances with service and emergency brakes?

6. If not, do you believe that truck manufacturers should provide emergency brakes at equal capacity to service brakes?

Emergency is Parking Brake

SOME of the questions on brakes are rather difficult to answer due to certain conditions which materially affect performance of brakes on vehicles.

However, all trucks, regardless of gross weight, should be capable of stopping in the same distance when traveling at the same speed, and we have found that to be the case in the majority of instances with the more modern trucks and when the brakes are kept in proper condition.

As to the distance required to bring a vehicle to a standstill when traveling at 20 miles an hour, there are a good many factors, which enter into this. From experience we have found that the three controlling factors are the kind of road surface, size of tire and the weight of the vehicle. Thirty-three feet appears to be a reasonable distance for the passenger-type units and light trucks equipped with four-wheel brakes, and 36 ft. for the same type of units equipped with two-wheel brakes, the latter being maximum performance for two-wheel brakes the average of which for the same type would require 50 ft.

After brake adjustments have been made with wheels jacked up, we road-test for equalization and judge the stopping distance and ability by feel, experience and performance.

Stopping distance can also be measured other than by a deceleration meter by marking off the roadway and having an accurate speedometer.

In answer to No. 5, we would say, "No," in most cases, because of the different methods used by the manufacturers in installing and hooking up the hand brakes. At this point we would also like to suggest that the emergency brake would be more appropriately described as a parking brake. Some car and truck manufacturers use all the service brakes for the hand brake, some use half of the rear-wheel brakes, others use all of the rear-wheel brakes and still others put it on the drive shaft, usually just back of the transmission. There seems to be no uniformity. With very few exceptions, the hand brakes on the automotive equipment with which we have come in contact are fit for nothing more than to hold the truck in position after it has been brought to a stop by the service brakes.

I do not think that it is essentially necessary for manufacturers of trucks to provide emergency brakes of equal capacity to service brakes, but they should so arrange their hand brakes that they will be effective in the case of an emergency. Some of the hand brakes of the type that are on the drive shaft might, if applied in the case of an emergency, have a tendency to twist the drive shaft off and leave an operator in a rather dangerous and helpless position. —H. E. WENNAGEL, *Traffic Manager, Wm. Schluderberg—T. J. Kurdle Co., Baltimore, Md.*

Uses Deceleration Meter

MY VIEWS on the questions pertaining to brakes for motor trucks are:

1. Yes, all trucks should be capable of stopping in the same distance when traveling at the same speed.

2. The distance is 37 ft. no matter what the requirement may be.

3. In testing brakes, distance is measured by a deceleration meter.

4. No. It could be measured, but not accurately.

5. No, it is not possible to obtain equal stopping distances.

6. No. In our estimation it does not seem the practical brake hookup inasmuch as your emergency brake, from our viewpoint, should be considered a parking brake. Most emergency brakes on heavy-duty equipment are the propeller-shaft type, and enough strain applied to such a brake would undoubtedly cause a great deal of breakage in the drive-line or rear-axle assembly.—JOHN LAWLER, *General Manager, Poultry Producers of Central California, San Francisco, Calif.*

Value of Puncture-Proof Tubes and Sealing Compounds

Question No. 20

1. What is the real value of puncture-proof tubes and puncture-sealing compounds as determined from actual operation?

2. Are puncture-sealing compounds preferable to or more economical than puncture-proof tubes?

3. Do the benefits of puncture-proof tubes justify the extra cost?

4. Does the extra weight of puncture-proof tubes reduce the mileage obtained from tires?

5. Which is the more satisfactory and economical: (*a*) To use puncture-proof tubes with no spare. (*b*) To use ordinary tubes and carry as a spare a tire which has been removed from regular service but can be depended upon to get the truck back to its station in case of a puncture?

Reduce Tire Mileage

I WOULD say that puncture-proof tubes and puncture-sealing compounds are of no real value; that puncture - sealing compounds are neither preferable to nor more economical than puncture-proof tubes; and that puncture-proof tubes do not justify the extra cost. Answering No. 4, the extra weight of puncture-proof tubes does reduce the mileage of tires because the tubes do not dissipate heat. In regard to No. 5, we use ordinary tubes and carry as a spare a tire which has been removed from service.—EDW. A. SCHENK, *President-General Manager, Columbus Packing Co., Columbus, Ohio.*

KEEPING UP WITH THE FIELD

Problems of Baking, Dairy and Meat Industries—Legislation—Federal Action—Taxes—Labor Troubles

Bill Hits Chains. Manufacturers who distribute at retail will have a serious crimp put in their operations if a new bill drafted by Representative Wright Patman should be enacted. Proposed as an amendment to the Clayton Act, the bill makes it unlawful for any manufacturer to transport in commerce "any article produced by such manufacturer for sale or distribution at retail by such manufacturer."

Patman Violations. Clarification of at least two issues growing out of the Robinson-Patman Act is now under way. Complaints lodged against five companies for violation of the law will bring decisions as to when a quantity discount constitutes prohibited price discrimination and as to the responsibility of those receiving preferential treatment in price.

Among the five alleged violators named by the FTC are two food manufacturers, Kraft-Phenix Cheese Corp. and Shefford Cheese Co. The complaint against Kraft-Phenix charges the respondent with discriminating in price between different purchasers with the effect of lessening competition between it and other manufacturers and between its customers, some of whom receive favored prices. The price discriminations constitute an allowance of a specific discount on differing quantities of loaf cheese in five-pound boxes; an allowance of a five per cent discount on purchases of $5 or more in which one delivery is required of packaged cheese and salad products; and an allowance of five per cent discount to all group purchasers of such products contracting for $100 worth or more per week, where store delivery is made and only one billing required.

The complaint against Shefford Cheese is substantially the same, except for differences in price allowances.

While awaiting decisions on these complaints, food manufacturers remain in doubt as to what they should and should not do in the way of concessions to dealers. According to Associated Grocery Manufacturers of America, advertising allowances remain suspended or canceled in so far as the larger food manufacturers are concerned. Great Atlantic & Pacific Tea Co., however, is said to claim that most of the companies serving it have renewed allowances.

One Southern company, Battern Coffee Co., Birmingham, believes it has solved the problem of meeting demands of retailers and yet conforming with the law. It offers to pay for space in retailers newspaper ads at the actual or "earned" rate.

Bakers at Atlantic City. Onward Bakers! was the slogan that took more than 10,000 representatives and friends of the baking and allied industries to Atlantic City, N. J., from Sept. 26 to Oct. 1. The 1936 National Bakers' Conference and Exposition was in session.

The exposition, the first in six years, included 175 exhibits.

Throughout these exhibits were evidences of the progress made in the baking industry during the six years. Stainless steel construction in mixers is now standard. Six years ago it was novel. Use of roller bearings, fully enclosed housings, gear-in-head motors, fully jacketed tubs, time clocks and automatic timer attachments for mixers are all new. Over-and-under-weight dial scales and dust-catching sliding sleeves are refinements on weighing hoppers. Slicers and wrapping machines have undergone marked changes for the better, with the slicers now regarded as standard equipment. In all, equipment changes have been made for greater simplicity in construction and flexibility in operation.

Coolers of the zone, counter-flow and vacuum types are newcomers, as are phosphor-bronze working parts on dividers and electric-eye control on wrapping, room-cooling, loaf-molding and weighing machines. Air sterilization by cold-light lamps made its bow.

Well attended conference meetings covered general, allied trades, bakery engineers, retail bakers' and sales promotion sessions. Throughout the "shop-talk" portions of the program for these sessions, the theme was the need for better flavor quality in the finished bakery product.

Indications that the bakers were going "Onward" were seen in the numerous "Sold" cards that decorated the equipment on exhibit. Reports have it that practically every unit on exhibit was sold before the exposition closed, and that total sales of equipment amounted to about five million dollars.

New Angle on Food Bill. Senator Copeland has stirred up a new argument on food and drug legislation. He is said to be incorporating in his new bill a

Exhibit of bakery equipment at Atlantic City Convention Hall. Held in conjunction with the annual meeting of American Bakers' Association, the exposition was the first in the baking-equipment and supply industry in six years. Greater use of stainless steels and improved machine design were in evidence.

provision creating a new federal agency to administer it. The idea is to remove the controversy between the Federal Trade Commission and the Food & Drug Administration as to who should have charge of enforcement.

Dairymen Talk Shop. With a registration exceeding that of any previous meeting by some 20 per cent, the International Association of Ice Cream Manufacturers and International Association of Milk Dealers met in Atlantic City Oct. 12-17 to discuss their problems and to see what was available in the line of new equipment.

There was much interest in the exposition because of the demand for more economical plant operation. Appreciating this demand, equipment manufacturers had on display more new designs than ever before. The trend is toward more smooth-looking, "streamlined" equipment, most of it lower in height than heretofore. And one thing of outstanding interest was a new tank truck which has no frame. Designed by E. J. Lockwood, chief engineer, Borden Farm Products Co., it has 50 per cent greater capacity than the usual tank-trailer and tractor combination.

In the ice cream sessions, the tax problem was the leading topic. Ellsworth C. Alvord, Washington tax attorney, urged companies to begin now to figure their taxes and dividend disbursements that they may save heavy penalty taxes on undistributed profits.

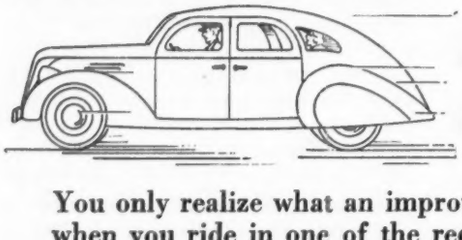
Dr. Harry A. Ross, Borden Co. economist, told the dairymen that the cost of raw materials will be upward for the next three or four years. He warned against being misled by the temporary current surplus of milk. When cows go on winter feed there will be a real reduction in the supply of milk, Dr. Ross prophesied.

Dairies Accused. Virtual control of the New York metropolitan milk shed by Borden Co., National Dairy Products Corp. and the latter's subsidiary, Sheffield Farms, Inc., has been charged by Federal Trade Commission.

Borden Co. at times refrained from competing with other large companies and sometimes acted to maintain resale prices by persuasion, where feasible, and by more drastic action where necessary; and control of resale prices in some cases was made effective by discontinuing all discounts and threatening to cut off supplies, the FTC reported. But Borden was absolved from control or domination of Dairymen's League Cooperative Association, from which it purchases a large part of its supply.

National Dairy was charged with shifting plants from one subsidiary to another to cause some farmers to receive surplus instead of Class I prices for their milk. By this farmers are said

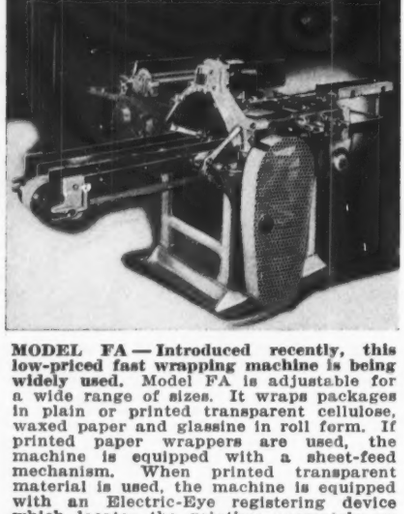
The Old Car seems to do very well...



until you ride in a new one!

You only realize what an improvement has been made in cars, when you ride in one of the recent models . . . And you will probably also find it far less costly to run.

Your wrapping machines should likewise be compared with modern models, if you want to be sure that your packaging department measures up to present-day efficiency.



MODEL FA — Introduced recently, this low-priced fast wrapping machine is being widely used. Model FA is adjustable for a wide range of sizes. It wraps packages in plain or printed transparent cellulose, waxed paper and glassine in roll form. If printed paper wrappers are used, the machine is equipped with a sheet-feed mechanism. When printed transparent material is used, the machine is equipped with an Electric-Eye registering device which locates the printing accurately on the package.

Wrapping machine design and construction have advanced considerably in the past few years, and this reflects itself not only in greater plant efficiency (lower costs) but also in the package itself—an important sales advantage.

If you will write and tell us what your present packaging equipment is, we will tell you what our latest machines of each type will do in comparison.

Write to our nearest office

PACKAGE MACHINERY COMPANY • SPRINGFIELD, MASSACHUSETTS
New York Chicago Cleveland Los Angeles
Mexico: D. F. Apartado 2303. Peterborough, England: Baker Perkins, Ltd.
Melbourne, Australia: Baker Perkins, Pty., Ltd.

PACKAGE MACHINERY COMPANY
Over 200 Million Packages per day are wrapped on our Machines

CONVENTIONS

NOVEMBER

8-10—New England Bakers' Association, Statler Hotel, Boston.
9-11—National Food Distributors' Association, Southern regional meeting, Hotel Adolphus, Dallas.
10-11—National Creamery Buttermakers' Association, Stoddard Hotel, La Crosse, Wis.
10-14—Second Poultry Industries Exposition, Port Authority Bldg., New York.
11-13—Pacific Coast Annual Dairy Conference, Olympic Hotel, Seattle, Wash.
11-13—American Institute of Chemical Engineers, Lord Baltimore Hotel, Baltimore.
12—Association of Pacific Fisheries, Hotel Del Monte, Del Monte, Calif.
17-19—Southern Association of Ice Cream Manufacturers, Arlington Hotel, Hot Springs, Ark.
30-Dec. 2—Associated Grocery Manufacturers of America, Waldorf-Astoria Hotel, New York, N. Y.

DECEMBER

2-4—American Society of Refrigerating Engineers, Hotel Pennsylvania, New York.
7-10—Association of Dairy, Food & Drug Officials, Miami Biltmore Hotel, Coral Gables, Fla.

to have lost $17,600 during April, 1935, a rate of $200,000 a year. The company was also alleged to have obtained special allowances and discounts on purchases of supplies for its subsidiaries, and to have exercised control over Sheffield Producers' Cooperative Association, Inc., being the only customer of that group of farmers.

Packers Forsee Lean Years. Small volume, poor average quality of meat, an increasing dollar turnover and keen competition are the outlook for the meat packer. This is what C. L. Harlan, Department of Agriculture, told members of Institute of American Meat Packers at its convention in Chicago, Oct. 9-13. And the second half of the decade of the Nineteen Thirties will be conspicuous for its consumer complaints against the high meat prices they will have to pay, Mr. Harlan stated. Hogs will be in short supply for three years, and this without a sufficient increase in cattle and sheep to offset the loss, he explained.

Frank A. Hunter, chairman of the Institute, warned packers that "we have no right to rate inventory enhancement as a profit. If we expect to make any money we must make it on our sales. We are definitely behind the times as long as we do not demand a price that gives us a reasonable return."

W. W. Shoemaker, vice-president of Armour & Co., also talked about profits, pointing out that the return of packers on their investment had averaged 3.49 per cent for the last eleven years. He said that the average profit was 0.92 cent per pound of gross sales.

Paul S. Willis, president of Associated Grocery Manufacturers of America, drew an interesting parallel between the Patman Act and the Interstate Commerce Act. The latter was enacted in 1887 to regulate practices of railroads and eliminate secret rebates and special low rates to certain shippers.

CONCENTRATES

• Regulations pertaining to government contracts as made under the Walsh-Healy law are being revised, so manufacturers are not to accept the present ones as final.

• *State department representations are to be made as a result of a price-fixing food and drug law in Peru that involves examination of books at American manufacturing plants.*

• California Olive Association has approved a series of regulations requiring labels to include the name and style of product, net weight, number, nature of pack and an illustration approximately to scale.

• *Potatoes to be used in making potato chips should be stored at temperatures between 60 and 70 deg. F., the Bureau of Plant Industry has discovered.*

• Wisconsin Accredited Cheese Factories has been organized to better conditions in Wisconsin cheese plants, to improve the quality of their products, and discourage illegal and unfair trade practices.

• *The constitutionality of the amendment to the Packers and Stockyards Act which permits federal supervision of live-poultry marketing has been upheld in the district court of eastern Pennsylvania.*

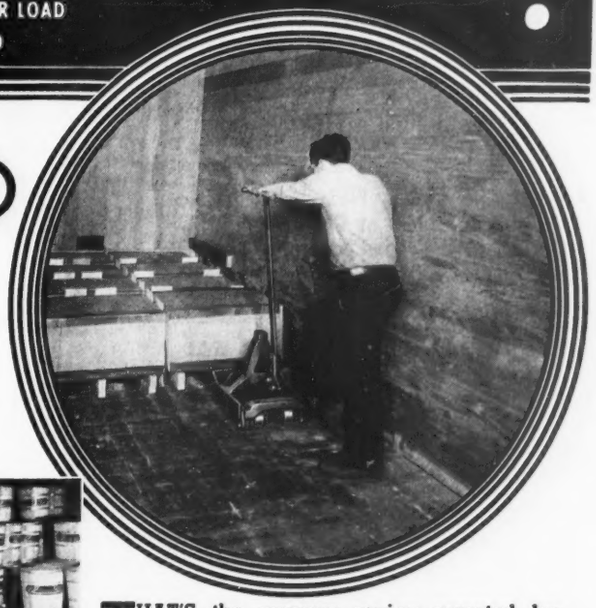
• A new type of food store has made its appearance, the Department of Commerce reports. Sales are from bulk only. The store is largely an array of barrels.

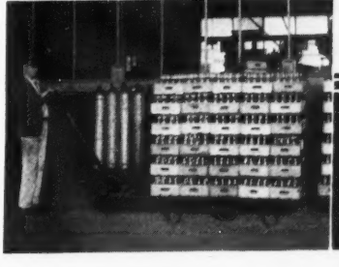
• *Domestic producers of wines and other alcoholic beverages believe that the large amount of revenue which they pay entitles them to more government services. All federal assistance dropped with repeal, they say.*

$72.00 SAVED!

ON EVERY CAR LOAD HANDLED

TRADE YALE MARK





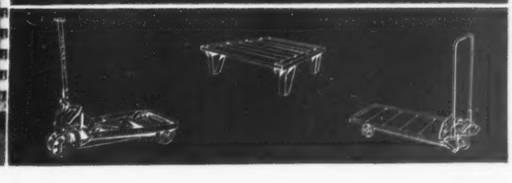
THAT'S the average saving reported by concerns who use the Yale Tin Plate Hand Lift Truck for their tin plate handling work. Ten cents on every 100 lbs. handled — $72.00 on every car load — economies worthy of consideration in any plate.

TIN PLATE or FOODS . . . the story is always the same — when Yale Trucks go on the job handling costs go down — that's why so many manufacturers in the food industry are Yale equipped . . . they know Yale Hand Lift Trucks and Skid Platforms are built to lift and haul loads economically — No lost time or lost motion. Each and every type of truck is a money saver.

Let our representative tell you WHAT and HOW this type of equipment can save on YOUR materials handling jobs. No obligation.

THE YALE & TOWNE MFG. CO.

PHILADELPHIA DIVISION, Philadelphia, Pa., U.S.A.



MEN... JOBS... AND COMPANIES

Industry

• ARBUCKLE BROS. has sold its Yuban coffee brand to Paton Corp., New York.

• BEATRICE CREAMERY Co. has taken over Boyer Ice Cream & Dairy Co., Paris, Ill.

• BERKE CAKE Co., Brooklyn, N. Y., has constructed a new plant which greatly increases its production facilities.

• HIRSCH BROS., Chicago, is entering the battle for soup sales by bringing out a line of nine canned soups in 15-oz. tins.

• HOFFMAN BEVERAGE Co., Newark, N. J., plans to build a $160,000 storage building.

• IGLEHEART BROS., INC., has leased a flour-blending plant at Charleston, S. C. The plant has been equipped for a capacity of 1,000 bbl. daily.

• W. K. KELLOGG Co., will enlarge two of its Battle Creek plants, build additional grain storage tanks with a capacity of 150,000 bu. of corn at its Canadian plant and erect two new factories in Australia. An expenditure of about $2,000,000 is involved, it is understood.

• KRAFT-PHENIX CHEESE CORP. will build a $2,000,000 air-conditioned plant in Chicago. Salad dressing and confectionery products will be manufactured and cream cheese packaged there. The plant will house research and control laboratories, a home economics department and executive offices. The building will have a stone exterior, glass-block windows and interior walls of colored tile. Kraft-Phenix also announces the purchase of cheese plants at Mountain Grove, Mansfield and Hartville, Mo. The company will enlarge its caramel-manufacturing facilities at Kendalville, Ind.

• NICHOLSON CREAMERY will build an $80,000 plant at Corsicana, Tex.

• OMAR BAKING Co. recently spent $150,000 to remodel its plant at Columbus, Ohio, and install new machinery.

• E. PRITCHARD, INC., is erecting a new office building at Bridgeton, N. J. The building will have a 40-ft. tower of glass block which will be illuminated at night. The executive offices will be transferred from New York to Bridgeton.

LESLIE N. PERRIN

He has been elected a vice-president and director of General Mills, Inc., and is in charge of grain purchasing. Mr. Perrin also is president of Star Grain Co. and a vice-president of Washburn Crosby Co. and Red Star Milling Co. These companies are subsidiaries of General Mills.

• RALSTON-PURINA Co. will construct a $750,000 cereal plant at Battle Creek, Mich. The factory will produce Shredded Ralston.

• STANDARD NUT MARGARINE Co., Indianapolis, is constructing a new plant for refining soy bean oil and utilizing it in food products.

• STOKELY BROS. & Co. plans to construct a canning plant at Mercedes, Texas, with a daily capacity of 5,000 cases. The company recently took over Santa Cruz (Calif.) Packing Co., and it has moved into larger quarters at Oakland, Calif.

• SWIFT & Co., Chicago, will erect a modern meat plant and distribution house at Charlotte, N. C. The company recently purchased the Letterman baking plant at Williamsport, Pa.

Personnel

• RUSSELL COOK is now research director for Wilbur Suchard Chocolate Co., Lititz, Pa. He formerly was with Luden's, Inc.

• A. E. DANIELSON has been made manager of the Tifton, Ga., plant of Armour & Co. He formerly had been manager of the company's Huron, S. D., branch.

• MILTON E. ENGLERT recently resigned as vice-president, treasurer and sales manager of Renner Brewing Co., Youngstown, Ohio, to go with Fort Pitt Brewing Co., Pittsburgh, as vice-president and sales manager.

• ROBERT H. GROSCH, who has been supervising production for a group of large bakery owners, has joined the bakery-service staff of Pillsbury Flour Mills Co., Minneapolis, effective Jan. 1, 1937. He has in the past been connected with W. E. Long Co. and Wahl-Henius Institute.

• WALTER C. HASSELHORN has become vice-president and general manager of W. K. Kellogg Co., Battle Creek, Mich.

• CLARK HEMPSTEAD has been elected president of Pillsbury Flour Mills Co. He was counsel-secretary and vice-president.

• GEORGE HOMER has succeeded William Morgan, resigned, as manager of Denison (Texas) Peanut Co.

• A. B. HOPPE has been made executive vice-president of Loft, Inc., Long Island City, N. Y. He is also a member of the board of directors. Mr. Hoppe had been associated with Liggett Drug Co. for 25 years.

• W. F. JENSEN, who retired recently as secretary-manager of American Creamery Butter Manufacturers' Association, has opened a brokerage office in Los Angeles.

• B. C. KIRKLAND, secretary-treasurer and manager of Battle Creek (Mich.) Food Co., and Frank W. Le Fevre, comptroller, resigned recently.

• EUGENE C. MITCHELL, vice-president of Washburn Crosby Co. at Kansas City, has been transferred to the Washburn Crosby plant at Buffalo, N. Y.

• WILLIAM H. PAULY, secretary-treasurer of Pauly & Pauly Cheese Co., Milwaukee, has been elected chairman of the board of Kingsbury Breweries.

• C. L. TISSLER, formerly production manager of the Dennison, Texas, plant

of Kraft-Phenix Cheese Corp., will operate the company's recently acquired plants at Mountain Grove, Mansfield and Hartville, Mo.

• LIONEL TRUE, Grey Milling Co., Springville, N. Y., has been reelected president of Mutual Millers' and Feed Dealers' Association.

• WILLIAM B. UIHLEIN, chairman of the board of Schlitz Brewing Co., Milwaukee, has resigned.

Deaths

• T. L. BELLINGRATH, JR., secretary-treasurer and general manager of Coca-Cola Bottling Co., Little Rock, Ark., recently.

• ARMINIO CONTE, 55, founder of Milwaukee Macaroni Co., recently, in Naples, Italy.

• JOHN DECKER, 85, who operated an ice cream company in Nashville for more than 40 years, recently.

• FRANK S. FISHBACK, 70, president of the Indianapolis pancake-flour company bearing his name, Sept. 25.

• FREDERICK S. GLIDDEN, 60, president and founder of Sunlite Dessert Co., Waukesha, Wis., Sept. 22. He had been a leader in the jelly-powder business for 35 years.

• GILBERT H. HOOD, 70, president of H. P. Hood & Sons Co., Oct. 2, at Somerville, Mass. He had been with Hood for nearly 50 years.

• WILLIAM HORLICK, 91 founder and president of Horlicks Malted Milk Corp., Racine, Wis., Sept. 25. He originated malted milk and discovered formulas for producing dry extract of malt and similar dehydrated food products.

• LAWRENCE JONES, JR., 38, president of Jefferson Island Salt Co., Louisville, Ky., recently.

• J. EDWARD MALONEY, 56, former president of Brighton (Mass.) Dressed Meat Co. and principal stockholder in Maloney Packing Co., Boston, Sept. 27.

• HENRY R. MILLER, 73, founder of Wellington Provision Co., Cleveland, Sept. 26.

• OTTO H. SENGLAUB, 62, secretary of Kingsbury Breweries, Manitowoc, Wis., and identified with the brewing industry for 35 years, Sept. 23.

• ALDEN B. SWIFT, 50, a vice-president and director of Swift & Co., Oct. 13.

• HARRISON H. WHITING, 59, president of Pillsbury Flour Mills Co., Oct. 3. He entered the employ of what was then the Pillsbury-Washburn Co. at the age of twenty in a stenographic and clerical capacity.

Associated Industries

• ALSOP ENGINEERING CORP. has a new factory in Milldale, Conn.

• FRICK Co., Waynesboro, Pa., has appointed Clarence C. Smith assistant sales manager.

• OWENS-ILLINOIS GLASS Co. has constructed a corrugated-container plant and warehouse at Gas City, Ind.

• LEEDS & NORTHRUP Co. has opened a new sales and service office at Boston.

• FOSTER D. SNELL, INC., has opened a branch at Baltimore.

DOES YOUR CLEANER
have FOUR WHEEL BRAKES?

OR DOES IT go right on etching and spangling metal surfaces without restraint? Controlled cleaning is possible only with a controlled cleaner—METSO.

Leading food manufacturers rely on Metso for a two-fold purpose:

1. Vigorous alkali activity to remove all dirt, fats, oils quickly, completely
2. Silica monitor action to curb corrosive effect on sensitive metal surfaces

Clean all your equipment, utensils and containers faster and thoroughly with Metso and keep them shining and lustrous. You pay no more for the extra safety margin in Metso.

Try a sample yourself, or let our field man demonstrate Metso's safety to you.

PHILADELPHIA QUARTZ COMPANY

General Offices and Laboratory: 125 S. Third St., Phila., Pa. Chicago Sales Office: Engineering Bldg. Distributors in 60 cities. Sold in Canada by National Silicates Ltd., Toronto. U. S. Pat. 1898707

EST. 1831

METSO CLEANERS

idly formed, since, as has been mentioned, the depth of the oxygenated region is proportional to the square root of the oxygen pressure.

From the foregoing, it will be obvious why the discoloration due to methaemoglobin formation is rapid in tissue stored at 0 deg. C. in gases containing small quantities of oxygen (e.g., commercial nitrogen), for methaemoglobin near the surface has a greater effect on the color of reflected light than the same quantity at a greater distance under the surface.

Brooks investigated the effects of CO_2 at 0 deg. C., avoiding drying of the tissue. Two possibilities were foreseen: (1) a change in the depth of oxygen penetration due to the change in the partial pressure of oxygen, and (2) a change in the rate of formation of methaemoglobin.

He found that, with moderate concentrations of CO_2, the extent of the decrease in the depth of oxygen penetration was insufficient to account for the rate of discoloration observed, and also that oxygen penetration was still proportional to the square root of the oxygen pressure up to a concentration of CO_2 as high as 30 per cent, so that CO_2 had no effect on this factor.

Only when the concentration of CO_2 reached 30 per cent was there any appreciable acceleration of the rate of oxidation of haemoglobin to methaemoglobin, and with very high concentrations, rapid discoloration took place. It is of interest to note that oxidation of the sample stored in commercial CO_2 (containing a small amount of oxygen) was complete in three days, as compared with six to eight weeks in air itself.

CO_2 concentrations of less than 20 per cent had no effect on the oxidation of the haemoglobin in muscle.

Moisture is very important, and the rate of formation of methaemoglobin in partially dried muscle appears to be slower than in normal muscle. It will thus be seen that a beneficial effect on appearance will be conferred by drying to some extent the exposed muscle of chilled carcasses. More drastic drying, however, causes the muscle to become black. These changes are not chemical in nature, as they are observed equally on drying in pure nitrogen. They may be explained by the fact that in large muscles there is a sharp water-concentration gradient near the surface when drying commences. Consequently the color change is marked although the loss of water is small.

The thin layer of connective tissue covering the muscle does not prevent loss of water or free access of oxygen.

A heavy growth of bacteria on muscle can in some cases cause a color change by a direct influence on the pigment. It may be that, in the early stages of putrefaction, the rapid formation of methaemoglobin is increased, but later on this is reduced to haemoglobin, which is finally broken down to simpler substances. These changes may be brought about by drainage of blood or long storage in excessively moist atmospheres.

An interesting application of work with gases is provided by a German patent specification[36] taken out by R. Heiss, which, although primarily concerned with freezing meat (with cold brine), claims to prevent discoloration by treating with carbon monoxide (N.B.: CO, not CO_2) or hydrogen, preferably prior to freezing.

In the next installment will be described the practical application of carbon dioxide for gas storage.

Why delay . . .

BENEFIT NOW

by the more Complete Protection

OAKITE

Cleaning & Sterilizing

can give you!

If protection to product flavor and quality are important to you . . . if more complete control of bacteria and mold growths will help you prevent spoilage and loss . . . if more effective, low-cost cleaning and sterilizing are what you are seeking, why longer deny yourself the many benefits modern Oakite materials can provide you RIGHT NOW?

Safe on Equipment

The Oakite cleaning and sterilizing materials our trained Service Representative recommends for your plant are SAFE to use on equipment surfaces, rinse easily and completely, help you more readily maintain the sanitary standards you desire. Tell us your problem or write for booklets relating to your industry.

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26G Thames Street, NEW YORK, N. Y.

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in All Principle Cities of the U. S.

THESE ADVANTAGES CAN BE YOURS

Safety to equipment surfaces

•

Real economy in time, material and effort

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Easier maintenance of high sanitary standards

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Over 50 different Oakite materials available for every food industry cleaning requirement

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Nation-wide organization at your service at all times

OAKITE

TRADE MARK REG U.S. PAT. OFF.

SPECIALIZED INDUSTRIAL CLEANING MATERIALS & METHODS

Taking "Bottle Necks" Out

(*Continued from p. 564*)

wages and falls in the indirect classification as do Account No. 207 covering janitor wages and Account No. 503, the wages of loaders and checkers.

On the basis of tonnage and production value these labor costs are rated as to percentage and cost per 100 lb. of goods produced.

Rating of the oven capacity is based on its length, width, speed of travel, and number of loaves it can handle in the baking time. The oven is a tunnel type traveler with a length of 50 ft. (600 in.) and a width of 9 ft. 8 in. (116 in.). It is speeded to give a baking time of 22½ min. (1,350 sec.) which means that the conveyor has a travel speed of 0.44 2/5 in. per sec. or a travel distance of 1 in. in 2.25 sec. The pans used are 10 in. in length strapped in sets of 5 pans per strap. Two straps extend the width of the oven which means that 10 loaves are termed "A load." On that basis the time of travel per load (22.5 sec.), is the length of a pan (10 in.) multiplied by the time the conveyor travels 1 in. (2.25 sec.). When operating continuously on a full load basis the oven has a capacity of 1,600 loaves per hour (3,600 sec. per hr. divided by 22.5 sec. per 10 in. loaf load).

The "Labor Cost Ticket" (Form No. 4) was introduced to establish an actual labor cost test on all operations in the production schedule for each product item.

These studies and forms have served so well the purposes for which they were made that the plant in which they were applied has shown an actual saving of 20 per cent in labor cost with no expense for addition of new equipment.

The Menace of Pale Butter

(*Continued from p. 558*)

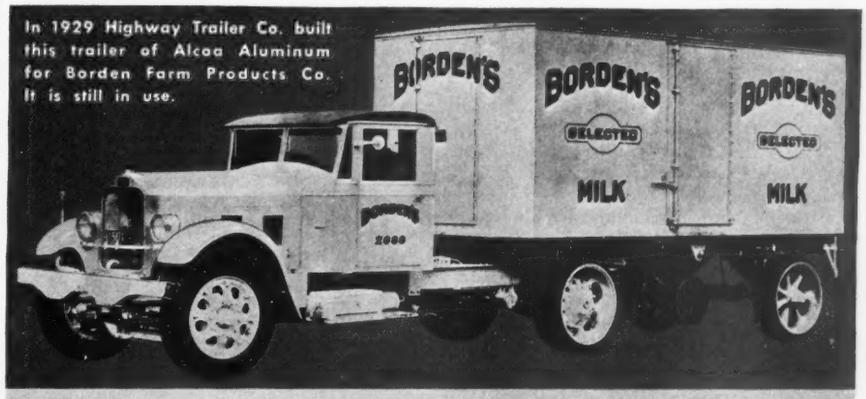
is because of the ever increasing use of more highly refined foods and the adoption of special diets.

It has been stated by Doctor Rose of Columbia University that "the necessity for a liberal supply of vitamin A in the human diet has been established beyond doubt." Recent studies appear to indicate that a child may make fairly good growth on a diet in which a quart of milk per day is the chief source of vitamin A. However, better provision for development and protection against infection will be afforded if the vitamin A intake is increased to at least twice the units in a quart of milk.

It is out of the question to expect the average person daily to buy and consume the quantity of green vegetables and other foods that would give him the equivalent of the vitamin A in two quarts of milk. Also, there are many individuals, especially adults, who could not comfortably consume two quarts of milk each day, although one quart might be taken. The dairy products necessary to provide adequate vitamin A in the diet would be about one quart of milk and two ounces of butter.

Any person can readily picture a quart of milk. But an eighth of a pound of butter, or two ounces, is not so readily pictured. Usually butter is served in the form of patties. The equivalent of two ounces would be eight patties.

However, eight patties per day of pale butter may not be adequate, although the same amount of butter with a high natural yellow color can be depended upon as a source of a sufficient supply of vitamin A in the diet of the normal individual.



This FIRST All Aluminum Trailer has hauled 4800 lbs. of Milk FREE EVERY TRIP FOR 7 YEARS!

. . . It's BONUS LOAD

In 1929, when this trailer was purchased, the higher scrap value for Aluminum was considered one of the principal sales arguments.

Right now, in 1936, the day when it will be scrapped is still well beyond prediction!

And during long service it has rolled up an enviable record of money saving. 4800 pounds lighter than the conventional trailer of heavy materials, it has carried 4800 lbs. of Bonus Load, 43 extra cans of milk, on every trip for 7 years. That extra pay load cost nothing to haul — it replaced the useless dead weight eliminated by building with Alcoa Aluminum. The saving quickly paid first cost and has regularly added to profits.

Even aside from this imposing economy, Alcoa Aluminum is the logical choice for carrying food. It doesn't rust, contaminate food, or harbor odor; it is easily kept pure and clean.

Your body builder will tell you how the cost-saving shapes and forms of Alcoa Aluminum are economically used to save weight on trucks. The full story, including also the operation cost angle, is told in a handbook which we will gladly send you, "*Alcoa Aluminum for Truck Bodies.*" ALUMINUM COMPANY OF AMERICA, 2152 Gulf Building, Pittsburgh, Penna.

ALCOA · ALUMINUM

BOOKS RECEIVED

PACKAGING, PACKING & SHIPPING, Edited by James O. Rice. Published by American Management Association, 330 West 42d St., New York, N. Y. 1936. 237 pp.; 8½x11¾ in., fabrikoid, illustrated. Price $7.50.

These subjects are as much of a production executive's problem as they are of the sales executive. He can well afford to give them as serious study as he gives to production methods and equipment, for the package is his potential problem child as long as he has to live and work with it in the plant.

Thirty-seven authors represented by the contents of this book have covered nearly every phase of the subject of packaging that appears to have industrial application. These authors are sales, production, advertising and promotion managers, heads of design departments; color specialists; typographic advisers; heads of shipping departments—generally of companies producing widely diversified products. They write from first hand knowledge of their subjects. Their papers have been read before the annual conferences on packaging and have been included in this compilation because of their authoritative value.

An illustrative feature of the book is the 64 pages of photographic reproduction of packages which have won awards in the American Management Association's annual contest for the Irwin D. Wolf trophy for merit in packaging.

Production executives can profitably spend the price of this book for the better understanding its contents will give them of their packaging, packing and shipping problems.

RICH LAND, POOR LAND. By Stuart Chase. Published by Whittlesey House, McGraw-Hill Book Co., 330 West 42d St., New York, N. Y., 1936. 361 pp., 5½x8 in., cloth, illustrated. Price $2.50.

Drought in the Middle West, floods in the East, dust storms on the Great Plains, have centered public attention on the soil of the American continent. Almost everyone now realizes the necessity for some improvement over traditional habits, if this soil is to be preserved in a condition that will allow future generations to extract a living from it. Also it must be remembered that present as well as future food manufacturers are largely dependent upon this soil for their raw materials.

So much has been said about this problem, that confusion has resulted as to how serious it is and what should be done about it. So Stuart Chase has performed a real service with the popular but complete treatment of the subject given in this book.

As a first step he outlines what the resources of the United States were 300 years ago. Then he tells, dramatically, what has happened to these resources up to date. And finally, he gives brief, but understandable, discussions of the methods available for controlling wind erosion, water erosion and soil fertility; and for conserving the remainder of our natural resources through sane exploitation combined with the avoidance of waste.

CHEMICAL ENGINEERING CATALOG. 21st Edition. Published by Reinhold Publishing Co., 330 West 42d St., New York, N. Y. 1936. 913 pp.; 8¾x11¼ in., illustrated, cloth. Price: Free on loan basis to holders of responsible positions in the Process Industries, which include chemical and food manufacture, in the United States and Canada; $3 to these for permanent possession; $10 to all others.

Although classified as a catalog this compilation is much more than a catalog. It is an encyclopedia of catalogs on equipment and supplies used by industries based on chemical reactions and processes.

It contains 50 pages more of data than does last year's edition and is organized into the same sections of Alphabetical Index, Trade Name Index, Equipment and Supplies Classified Index, Chemicals and Raw Materials Classified Index, Manufacturers Catalogs and Technical and Scientific Books. It is a handy buyers' guide.

PATENTS

Volatile Organic Fermentation Products Removed From Fermenting Mass During Fermentation—Henry Dreyfus, London, England. No. 2,503,769. Sept. 8, 1936.

Non-volatile Organic Fermentation Products Removed From Fermenting Material During Fermentation—Henry Dreyfuss, London, England. No. 2,053,770. Sept. 8, 1936.

Dehydrated Molasses Mixed With a Saponification Product to Lessen Absorption of Moisture—Guy Leonard, Baltimore, Md., and Byron E. Eldred, Scarsdale, N. Y., to Sukro Corporation. No. 2,053,871. Sept. 8, 1936.

Grain Disinfected With Fungicidal Preparation Containing Hydroxyphenylhydrazine—Wilhelm Bonrath, Leverkusen,-I. G. Werk, and Ewald Urbschat, Cologne-Mulheim, Germany to Winthrop Chemical Co., Inc., New York, N. Y. No. 2,054,062. Sept. 15, 1936.

Cream Concentrated, Homogenized, Packaged and Sterilized by Steam in Container and Sealed While Under Pressure Greater Than Atmospheric — Samuel Henry Ayers, and Charles W. Lang, Brooklyn, N. Y., to Crown Cork & Seal Co., Inc., New York, N. Y.. No. 2,054,065. Sept. 15, 1936.

Fruit Juices Concentrated to About 90 Per Cent of Original Volume, Packaged, and Sterilized by Passage of Steam Through Juice and Sealed While Still in Steam Atmosphere—Samuel Henry Ayers and Charles W. Lang, Brooklyn, N. Y., to Crown Cork & Seal Co., Inc., New York, N. Y. No. 2,054,066. Sept. 15, 1936.

Volatile Fatty Acids Separated From Fatty Materials by Fractional Distillation After Being Subjected to Temperatures Higher Than Boiling Points of the Fatty Acids—Ralph H. Potts, Chicago, and John E. McKee, Western Springs, Ill., to Armour & Co., Chicago, Ill. No. 2,054,096. Sept. 15, 1936.

Sausage Casings Marked With Waterproof, Smokeproof and Opaque Ink — Charles T. Walter, to Industrial Patent Corp., Chicago, Ill. No. 2,054,148. Sept. 15, 1936.

Egg Whites Thinned by Treating With Enterokinase at a Temperature Between 25 and 40 Deg. C. — Arnold K. Balls, Washington, D. C., and Theodore L. Swenson, Chevy Chase, Md., to the Public of the United States of America No. 2,054,213. Sept. 15, 1936.

Eggs Graded by Weight—George W. Leighton, Los Angeles, Calif. No. 2,054,260. Sept. 15, 1936.

Buns or Rolls Bored to Provide Space for Frankfurter or Other Edible Fillings—John G. Clarke, Providence, R. I. No. 2,054,409. Sept. 15, 1936.

Food Filled Cans Freed of Air by Inert Gas Prior to Sealing—John M. Young, (deceased), to American Can Co., New York, N. Y. No. 2,054,492. Sept. 15, 1936.

Fruit-Flavored Beverages Sterilized by Adding a Portion of Ingredients Heated to Higher Than Sterilized Temperatures to Remaining Ingredients in Container—John A. Bruce, Tampa, Fla. No. 2,054,494. Sept. 15, 1936.

Foods Cooked at Low Pressure Boiling for a Definite Period of Time and Finished With a Vigorous Ebullition — Ernst Heinrich Christian Grapengeter, Hamburg, Germany. No. 2,054,500. Sept. 15, 1936.

Cored and Baked Fruit Placed in Cans by Mechanical Means Preparatory to Syruping and Sealing—Joseph M. Landes, Waynesboro, Va. to The Hills Bros. Co., New York, N. Y. No. 2,054,514. Sept. 15, 1936.

Sugar Juice Extracted and Clarified in Two Step Circuits — Earle M. Copp, San Juan, P. R., to Petree and Dorr, Engineers, Inc., New York, N. Y. No. 2,054,556. Sept. 15, 1936.

Fish Cleaned on a Rotatable Wheel With a Plurality of Aligned V-Shaped Ribs—Edward H. Waugh to Smith Cannery Machines Co., Seattle, Wash. No. 2,054,576. Sept. 15, 1936.

Meat Cured by Treatment With Powdered Salt Mixture Containing Sodium Chloride With Fused Meat-Curing Nitrite and Nitrate in Fixed Proportions—Enoch L. Griffith to the Griffith Laboratories, Inc., Chicago, Ill. Nos. 2,054,623; 2,054,624; 2,054,625; and 2,054,626. Sept. 15, 1936.

Mono-sodium Glutamate Kept in Uniform Mixture with Group of Meat-Curing Salts by an Edible Adhesive Coating—Hugh E. Allen, Evanston, Ill. No. 2,054,646. Sept. 15, 1936.

Coffee Roasted in Edible Oil or Fat Preliminary to Making an Oil-in-Water Emulsion of the Fat, Milk, and Liquid Infusion Made From the Coffee After Roasting—Herman C. Andresen, Chicago, Ill. No. 2,054,689. Sept. 15, 1936.

Crustless Bread and Cake With Uniform Texture Produced by Generation of Heat Within the Dough — John Kremer, Southport, Conn. No. 2,054,756. Sept. 15, 1936.

Ice Cream Specialties Made in a Continuous Manner—Almond C. Routh, Sandusky, Ohio, to Vogt Processes Inc., Louisville, Ky. No. 2,054,835. Sept. 22, 1936.

High Maple Flavor Developed in Maple Syrup Through Evaporation of Sap to 10 to 35 Per Cent Solids Under Atmospheric Pressure, Further Concentration in Vacuum Pans at Temperature About 50 Deg. C. and Further Heating in Closed Vessel to Temperature of 120 to 150 Deg. C.—George Stafford Whitby, Rockcliffe, Ottawa, Canada. No. 2,054,873. Sept. 22, 1936.

Sausages Constricted Into Link Form by Pressure of Frames Stacked in a Horizontal Plane—Lewis C. Corey, Tulsa, Okla. No. 2,054,875. Sept. 22, 1936.

Raisins Washed by Mechanical Means Preliminary to Packaging—Raymond D. Robinson, Oakland, and Williams H. Noland, Fresno, Calif., to California Packing Corp., San Francisco, Calif. No. 2,054,949. Sept. 22, 1936.

Rice Canned—Takanoshin Domoto, Oakland, Calif. No. 2,055,120. Sept. 22, 1936.